

# THE BREECH-LOADER

AND HOW TO USE IT

*WITH NOTES ON RIFLES*



W. W. GREENER

UNIVERSITY OF PITTSBURGH



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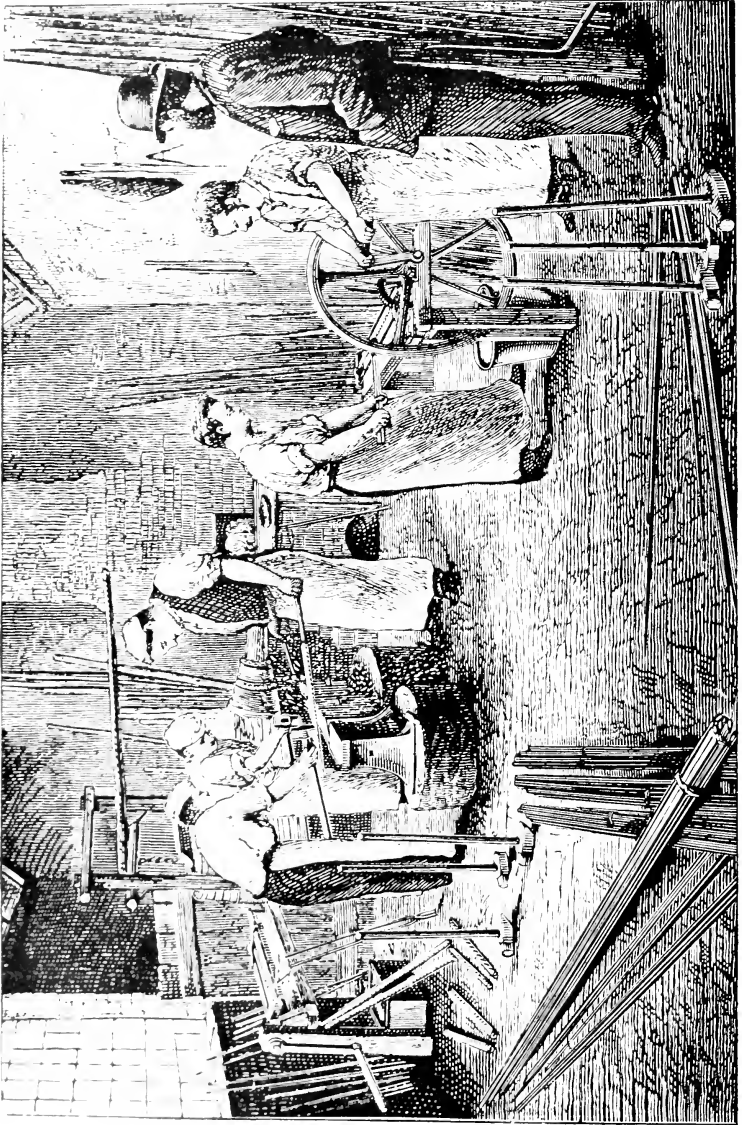


# THE BREECH-LOADER,

AND HOW TO USE IT.







GUN-BARREL WELDING AT W. W. GREENER'S WORKS, BIRMINGHAM.

# THE BREECH-LOADER,

AND HOW TO USE IT.

WITH

*NOTES ON RIFLES.*

BY

W. W. GREENER,

*Author of "The Gun and its Development," "Modern Shot Guns,"  
"Choke-Bore Guns," "Modern Breech-Loaders," etc.*

**Illustrated.**

*SIXTH EDITION.*



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## INTRODUCTION.



THIS treatise is written for that numerous class of sportsmen who delight in a day's shooting, but have neither the time nor the means to make the sport a life's study. Published at a popular price, it will, it is hoped, reach many who have hitherto been deterred from shooting, believing it to be an expensive recreation. The author's aim is to induce all who can to participate in a manly sport, and to advance the interests of those who look to the Gun for pleasure, health, or occupation.

The book is not written for experts, nor for those who have special opportunities for the acquisition of the art of shooting ; and in order to make it as attractive as possible to the general reader, many matters which would interest the enthusiastic shot only have been omitted.



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# THE BREECH-LOADER,

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## Part I.

### CHAPTER I.

THE SHOT-GUN: ITS INVENTION, HISTORY, AND VARIETIES — THE COMPONENT PARTS OF A GUN—CALIBRES, WEIGHTS, AND STANDARD CHARGES.

THE first use of small shot in fire-arms was made by German peasants and shepherds about the middle of the sixteenth century, and from the single-barrel wheel-lock musket of those days the present almost perfect type of sporting weapon has been slowly evolved. It was not until the middle of the seventeenth century that double guns were made small and light enough to be of use for sporting purposes, and it was a century later before ribs were added.

The flint-lock gun, as made at the commencement of the present century, was regarded by the sportsmen of those days as an almost perfect weapon. That celebrated maker, Joseph Manton,

lived long enough to see the introduction of percussion-caps, and joined in the stormy discussions as to the merits of detonating balls, caps, and flints—questions which vexed the sportsmen of his day.

The percussion-cap gun was a great improvement on the flint-lock, and although its day was short, it may be regarded as the most durable gun ever made, or probably ever to be made. Gun-makers then reverted to an ancient principle: that of breech-loading, and the much over-rated Lefauchaux gun and the truly great achievement of making the cartridge-case contain its own means of ignition were the immediate results.

The principle of dropping down the barrels for loading is that most generally adhered to by gun-makers, and has now attained its most perfect form. The pin-fire, or Lefauchaux cartridge, was quickly superseded by the central-fire system, introduced into this country by Mr. Daw, of Threadneedle Street, about 1861, and so enthusiastically championed by him as to become almost immediately popular. The great advantages of the central-fire system are—increased safety from accidental discharge, and greater certainty of ignition, non-escape of gas round the pin-hole, greater cleanliness, and greater speed in loading.

The rebounding lock by which the hammer rebounds automatically until it stands free from the striker is the latest important improvement applicable to the central fire gun of all systems of



breech-loading, but has in turn been quite superseded by the hammerless gun.

Before considering the advantages of the various types of modern guns, it may be advisable to give in detail the component parts of a gun, with such particulars concerning them as will enable any one quite unacquainted with fire-arms nomenclature to understand such technical terms as are found in all treatises of this kind, and know a gun thoroughly.

#### BARREL.

The tube in which the charge is fired, usually of iron rods welded together, sometimes of steel, drilled or rolled. In double guns the tubes are brazed together at the breech end, the lumps for holding the tubes to the breech-action body being dovetailed into them and brazed. The ribs are the bands of metal soldered to the tubes from breech to muzzle, the loop the small lump to which the fore part of the breech mechanism is attached.

The iron for the manufacture of gun-barrels was formerly made from scrap and old horse-shoe nail stubs. The modern way of preparing the metal for gun-barrels is to make the whole from new metal as follows:—Bars of prepared steel and superior gun-iron are placed together in fagots alternately, then heated to welding heat in a furnace, and placed under a tilt hammer, and welded into one bar, which is passed through rolls and cut into pieces; then go through the same

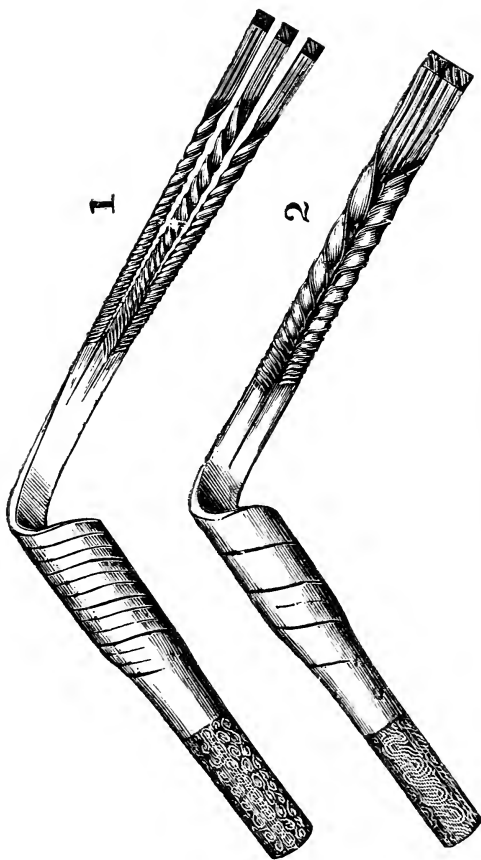
processes of hammering and welding again. The best metals made by this process are laminated steel and fine Damascus, the former containing a larger proportion of steel.

The cheapest kind of twist barrels is that called scelp twist, as illustrated. It is made from the commonest gun-iron, drawn out into ribands, and coiled round a mandril, and afterwards welded together. When finished and browned, the figure consists of narrow lines, light and dark alternately, which run spirally round and round the barrels, from breech to muzzle. This kind of barrel is used on the commonest guns only.

#### DAMASCUS.

The Damascus and laminated barrels differ only in the way that the iron and steel are put together in the first process.

For the cheaper or single-iron Damascus, a square rod is taken about four feet long and five-eighths inch thick, and placed in a forge fire until about eighteen inches of the rod is brought to a red heat, when one end is thrust into a square hole in a block made fast to a frame, and the other end fixed into a movable head at the other end of the frame. A rotating motion is then given to the movable head by means of a winch-handle and cog-wheels. The rod, being square, cannot turn round with the head, so is twisted on itself.



Processes of Barrel Welding.  
(1) Three-Iron Damascus; (2) Two-Iron Damascus.

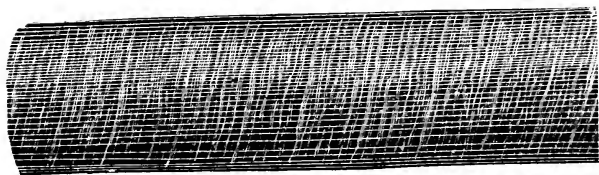
The cheaper quality laminated steel, which is also known in the trade as single-iron Damascus, is made by drawing out this one rod into a riband, which is afterwards coiled on a mandril and welded together. The illustration shows the figure of the barrel when finished. The next quality is two-iron Damascus or laminated steel, made from two twisted rods, each three-eighths square, and welded together and rolled into a riband, with the twisted spirals in opposite directions, as shown.

Three rods are used, and welded in the same way for the best barrels. This is the favourite number for English barrels. Sometimes, but rarely, four rods are used. Three rods make a very much finer figure than either one or two rods.

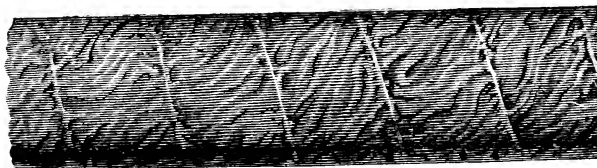
In Belgian barrels as many as six rods are sometimes used, but the over-twisting rends apart the fibres of the iron and the rods are weakened thereby.

Belgian barrels are considered to be inferior to those made in Birmingham, on account of the soft material used in their manufacture, there being but little steel in their composition. The figure is frequently obtained by using two different preparations of iron instead of iron and steel.

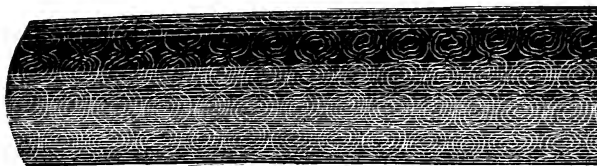
Belgian barrels are, therefore, not suitable for full choking.



Scelp Gun-Barrel.



Single-Iron Damascus Barrel.



Two-Iron Damascus Barrel.

## GREENER'S WROUGHT STEEL FOR GUN-BARRELS.

One of the greatest difficulties with which a gunmaker has to contend is the "grey" in gun-barrels. The "grey" is a defect of small actual importance, but decidedly a blemish on a fine weapon, and an eyesore in every description of figured gun-barrels.

The numerous twistings and weldings of gun-iron rods and ribands are fully described in the description of the barrel-welding processes, and it must have occurred to the reader that the Damascus barrel is one mass of welds from breech to muzzle. This is so, and unfortunately a certain amount of burnt metal (or scale) is embedded within some of these welds, and in the finished barrel this fragment of scale forms a "grey," or small speck of useless material, which will not colour in harmony with the other part of the barrel, but is made more apparent by the finishing processes of polishing and browning. These "greys" may appear some time after the gun has been in use, the hard metal composing the barrels being eaten into by rust, or the thin coating over the "grey" being worn away. They are developed in the inside by the chemical action of the powder gases, and are practically ineradicable. Sportsmen must not imagine that "greys" weaken a barrel to any appreciable extent, and their development in a gun after some

months', or some years' wear, in no way reflects upon the reputation of the gunmaker.

A barrel eaten right through with rust, at or near the muzzle, may be fired with perfect safety, and consequently a "grey" is not to be regarded as an element of danger; and barrels after thirty years' wear, or after firing upwards of 100,000 shots, are safe to use, providing they are free from dents, bruises, and rust inside. Best quality barrels can be ruined—and many have been—in a couple of seasons by rough, careless usage, firing when dented, and being allowed to rust inside and out.

A welded barrel will not stand a blow given sideways; a knock against a hard substance will dent one barrel and frequently break the other in the weld. Many more guns are ruined by hard knocks than by hard wear.

Owing to the great difficulty in procuring perfectly welded barrels, gunmakers are now discarding tubes of the Damascus variety for those of solid steel, which are free from "greys" and blemishes, and if carefully chosen and tested will fill every requirement of the sportsman.

The harder the Damascus barrel the greater the liability to "greys," and a soft barrel is of no use, as it will not stand the choking required to make it a hard, close-shooting weapon, nor, however well it may be choked, will it retain its good shooting qualities. For hard work, best steel is to be preferred to Damascus of any variety; and, among

other advantages, the following may be mentioned : dents and bruises more easily raised, barrels less easily rusted, not so liable to honeycomb at the breech, and the browning or colouring is more durable.

It has been urged against steel barrels, that owing to the absence of figure, the gunmaker would be able to substitute inferior metal for best quality steel, and thus impose upon his customers ; at the present time matters of equal importance are left to the decision of the gunmaker, and there is no ground for the supposition that a maker who values his reputation would vend an inferior article, or that a respectable dealer would misrepresent the quality of the steel in a gun-barrel.

The old method of drawing steel tubes is open to serious objection, but the present method of drilling gun-barrels from a solid forged bar enables the maker to produce a first-class article at a reasonable price. Such steel barrels are absolutely reliable, there is no danger of overheating ; the proof-house tests discover the weaknesses arising from any inherent defect in the metal, such as would result from a "blow-hole" in the raw ingot of cast-steel ; there is no fibre, and the absence of rolling and drawing processes precludes the possibility of the finished barrel having a "cold shut" or similar defect.

Steel-barrels are therefore to be preferred to the best Damascus, or any hand-forged or welded



tubes ; sportsmen who have used both are in favour of the steel, and gunmakers can recommend them with every confidence.

“Wrought Steel” is the name given by the author to a brand of metal specially suited to the requirements of the gunmaker for shot-gun barrels. In this steel the metal is not drawn, but is forged out of a solid bar, and drilled its whole length. Barrels so made are of close metal, stronger and denser than any obtainable by other means.

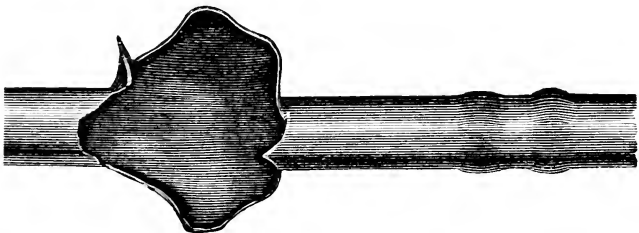
The “Wrought Steel” recommended is made of a homogeneous metal of very fine quality, and admirably adapted by its great tenacity, or tensile strength, for use in gun-barrels. It has been thoroughly tested by the author, as well as at the Government proof-house, with very heavy charges, viz., 28 drachms of powder,  $4\frac{1}{2}$  ounces of shot, this charge being equal to seven ordinary charges of powder and four charges of shot. This test, and many others, it withstands perfectly.

“Wrought Steel” barrels are of sufficient strength for all practical purposes, and only in appearance are they at a disadvantage when compared with twisted Damascus and laminated steel barrels.

Unlike “cast-steel” barrels of the old type, “Wrought Steel” barrels bulge instead of breaking, and increased strain produces an open burst similar to that of a welded barrel, instead of a sharp break or a longitudinal rip, as is found to

result with imperfect steel barrels. The quality of metal is such that it will stand successively more than double the strain to which a sportsman can submit his gun with fair usage. And it will not "rip" or "crack," however sharp may be the explosive used.

"Wrought Steel" barrels may be relied upon as being equal to the barrels manufactured by the Whitworth Company; and, further, they do not add to the price of guns costing over 20



Bulges and burst in a Barrel of "Greener's Steel."  
(Reduced to half size.)

guineas, whereas Whitworth barrels cost more on all qualities.

Many experiments with various explosives have been made in order to test thoroughly the fitness of this steel for gun-barrels, and the results have convinced the author that there is no material which will excel it, and, as the illustration shows, when tested to a bursting strain, the break which follows the bulging of the barrel is similar in character to the failure of Damascus under like circumstances.

The bulges shown in the illustration were caused by placing a small charge of shot between two felt wads at the spot where the bulges are, and firing an ordinary charge from the gun.

The burst was effected by increasing the charge of shot between the wads; the bulges appeared about fifteen inches from the breech-end after firing.

As many as five thick wads may be placed in any part of the barrel, and the gun fired without causing a bulge, but experiments have proved that even the small quantity of  $\frac{1}{8}$ -oz. shot placed between wads at any place in the barrel will cause a bulge even as near as nine inches from the breech.

The different sizes of the bulges in the illustration were caused by different charges of shot. The shape of the burst indicates the extent of bulging before bursting.

The illustration is reduced to half size.

As to the shooting qualities of steel barrels, it is not claimed that they shoot better than those of ordinary gun iron, as, good shooting is only obtained by skill in boring, but steel being harder, they should retain their shooting qualities longer than those of softer metal.

A barrel of "Greener's Wrought Steel," 30 in. long and 12 gauge, was reduced until it weighed only nine ounces, the metal in the chamber being only  $\cdot 038$  inch thick, and at the cone  $\cdot 045$  inch.

In order to test its strength, the charges

fired from it were gradually increased from 3 drs. and  $1\frac{1}{8}$  oz. shot to 5 drs. and  $1\frac{1}{2}$  oz.

With the last charge the barrel bulged slightly, as will be seen by the illustration D, which is an actual size representation.

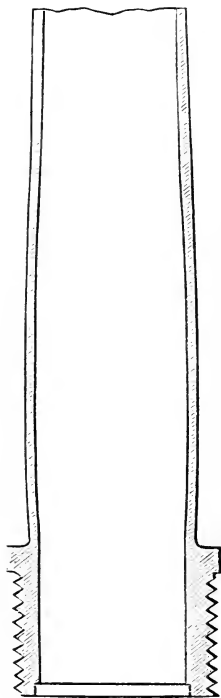
This experiment proves conclusively that in a barrel of an ordinary light game gun there is ample reserve metal to ensure safety with the heaviest charges.

It is necessary to announce that, owing to a trade-mark dispute, the author has discontinued the words, "Sterling Steel," in connection with this metal, having adopted as a trade-mark an elephant in combination with the words "Greener's Wrought Steel."

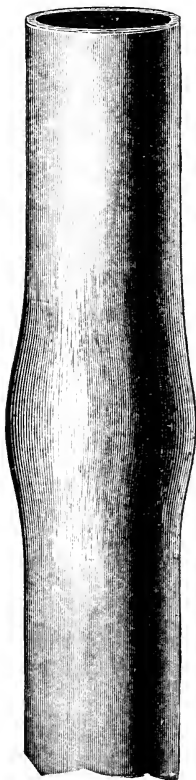
#### SIEMENS STEEL.

The process here described is the most common in England for the manufacture of Siemens steel shot-gun barrels.

A piece of steel is taken, about ten inches long, and having a diameter of two inches; a hole is drilled through it. It is then placed into a furnace, and, when at a sufficient heat, is passed through rolls, and drawn out to the required length. Barrels so made are fairly reliable, but there is a possibility of the steel getting overheated, which deteriorates the metal. Again, should there be a speck in the steel at the commencement, the process of rolling draws it out into a very fine split, imperceptible, perhaps,



D.—Section of reduced Barrel of "Greener's Steel" bulged by 5 drachms and  $1\frac{1}{2}$  oz. of shot.



Bulge in "Greener's Steel" Barrel, caused by an Obstruction in the Muzzle during Proof. (Full size.)

but still a serious fault, and one which may cause a burst.

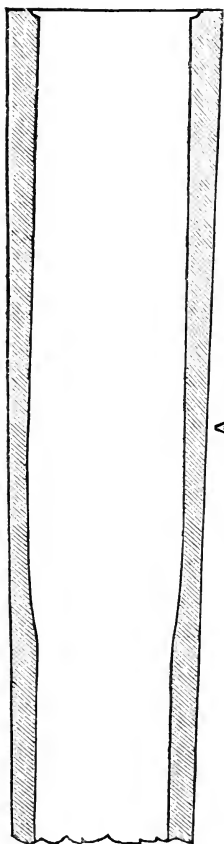
The only reliable method of manufacturing steel barrels is to forge out the metal into a solid rod, and afterwards drill the whole length.

The Siemens steel used upon the author's lower-priced guns is so drilled, and can be recommended as the next best to wrought steel.

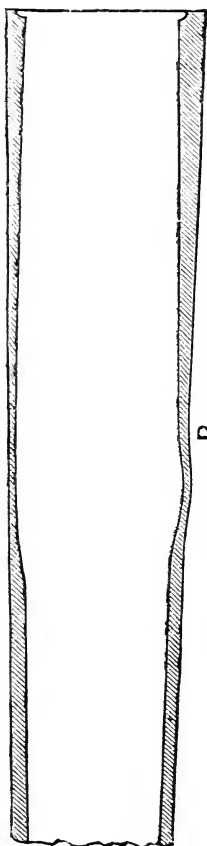
Other steels may possess the tenacity required of the material for shot-gun barrels, but none have yet proved so reliable. The alloys of iron, manganese steel, nickel steel, aluminium steel, and other materials possessing essential features, are not yet made of such uniform quality as will admit of their adoption by gun-makers of reputation for making into shot-gun barrels, although undoubtedly of such an alloy the guns and rifles of the future will be manufactured.

#### THE CHAMBER.

The annexed illustrations show a section of the breech end of the barrel of an ordinary light 12-gauge game-gun, exact size and shape of cartridge chamber, and thickness of metal. The thinnest part is at the commencement of the cone at the extremity of the cartridge chamber. To prove that there is sufficient metal to ensure safety with heavy charges, a 12-gauge barrel was reduced until it presented the appearance of Fig. B, the



Section of 12-Bore Barrel at Chambers (ordinary thickness).



Section of 12-Bore Barrel (reduced for experiment).

metal at the weakest point being 0.055 inch thick. It bulged slightly after repeated firing with  $3\frac{1}{2}$  drs. No. 4 Alliance powder, and  $1\frac{1}{4}$  oz. shot. An exact representation of the bulge is given in B. At 6 inches from breech, the barrel was but  $\frac{1}{8}$  inch thick, and there was no sign of bulging.

#### THE BREECH-ACTION

consists of the body to which the barrels are fitted, and in which the lock-work is arranged or attached, the bolts to secure the barrels to the body, the lever-spring, etc., to work the bolts, the joint-pin on which the barrels are hinged by the barrel lump, and the knuckle-joint against which the fore-part abuts.

#### FORE-PART.

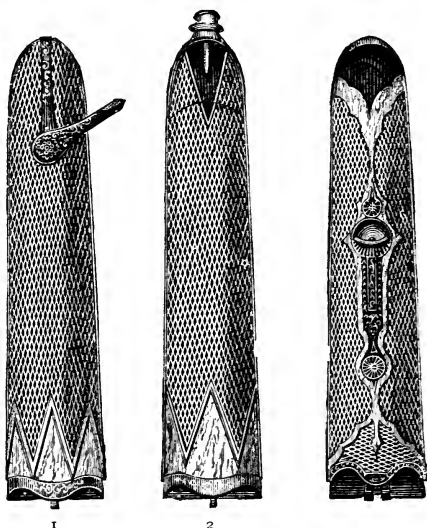
A detachable piece which completes the breech mechanism, and forms the knuckle-joint; it lies under the barrel, to which it is secured by a fastener engaging with the barrel loop. (*See Illustrations.*)

#### LOCK-WORK.

The firing mechanism of the weapon consists mainly of a spring, which is compressed as the hammer is cocked, a sear which enters a notch in the tumbler to hold the hammer at cock until the trigger is pulled, and such firing pins, nipples, pins, bridles, etc., as are necessary to secure the



mechanism to the lock-plate in the breech-action body, and communicate to the percussion-cap in the cartridge-case, the force of the blow given by



1 Grip.                      2 FORE-ENDS. Anson.                      Deeley and Edge.

the liberated mainspring. It also includes safety-bolts and various devices to protect the user of the gun from the accidental discharge of the weapon.

STOCK.

The handle of walnut-wood to which the gun

is fixed, in order that it may be fired from the shoulder, aligned, balanced, and the various mechanisms manipulated with ease. The furniture of the stock consists of the heel-plate, trigger-guard, etc.

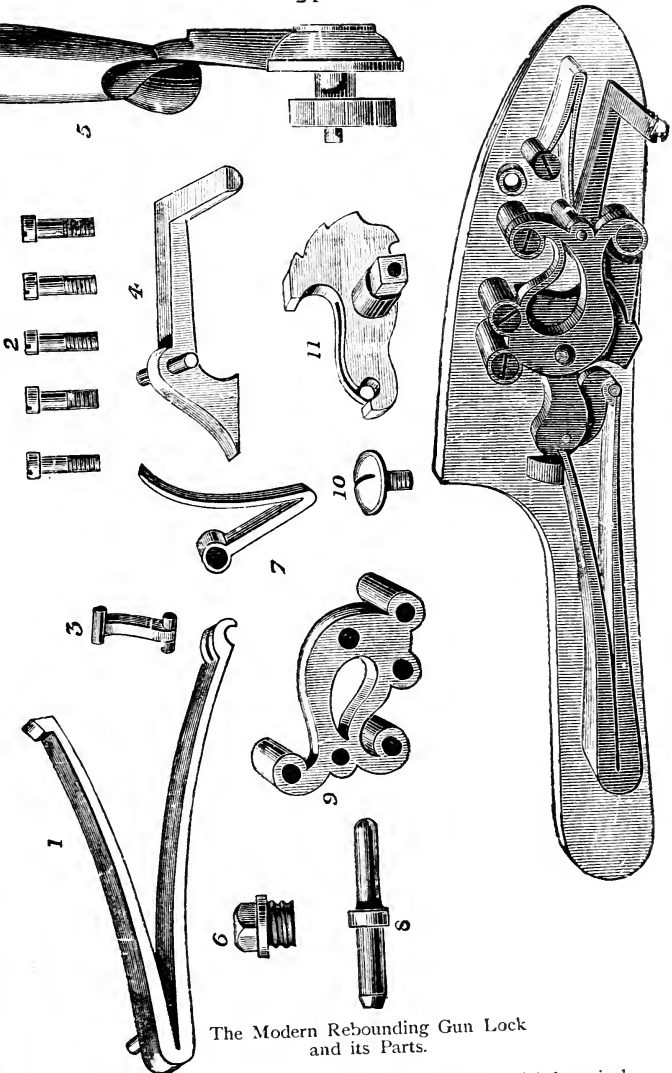
#### TYPES OF MODERN GUNS.

The modern gun is made in various styles, of divers types, and several principles of breech-action. The characteristics of these are illustrated by the following descriptions :—

The original Lefauchaux gun, with lever moving horizontally to the right, and lying under and parallel to the barrels when the gun is closed, is rarely seen in this country. On the Continent and in the French, Portuguese, and Dutch colonies it is still found in daily use.

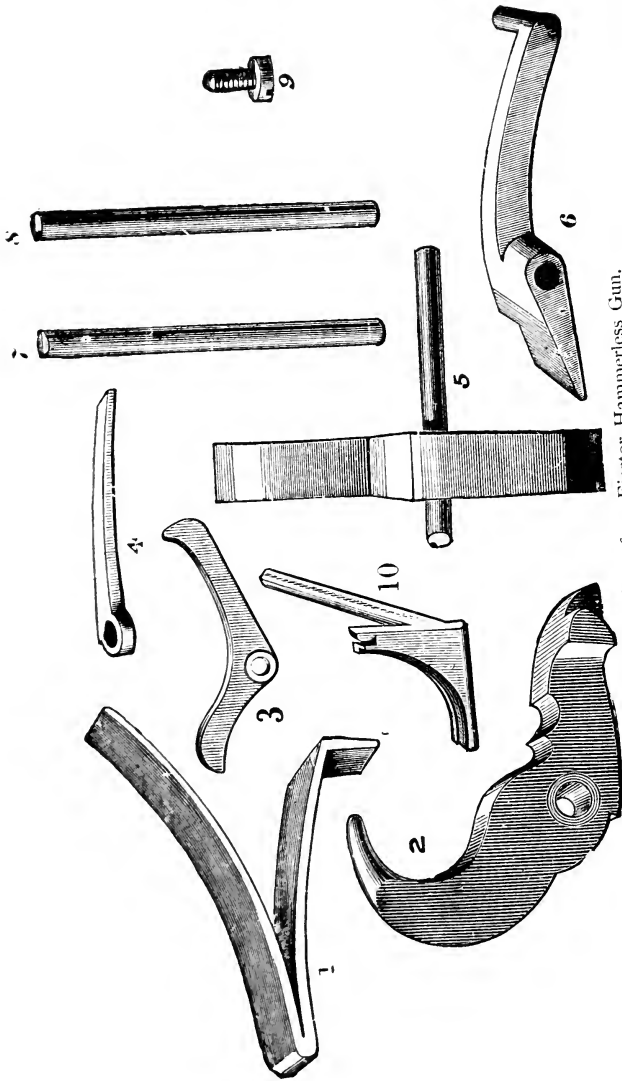
The English modification of the Lefauchaux principle is known as the Double Grip, and is applicable to the central-fire system. It is still in favour with Indian sportsmen, and also for large-bore guns and rifles. The accompanying illustration (Plate I.) is a reproduction by photography of a ball and shot-gun; it also represents a large-bore rifle made on this system of breech-action, and, next to the Treble-Wedge-Fast, is recommended as being simple and efficient.

The side-lever snap-action gun has one staunch adherent in the English gun trade; it was at one time much patronised by American sportsmen, but



The Modern Rebounding Gun Lock  
and its Parts.

(1) Mainspring; (2) the bridle and scar-spring pins; (3) the swivel; (4) the scar; (5) the firing mechanism in connection with the lock consists in its simplest form of the hammer; (6) the nipple; (7) the scar-spring; (8) the striker; (9) the bridge; (10) the tumbler-pin; (11) the tumbler.



The Lock Mechanism of an Ejector Hammerless Gun.

(1) The mainspring; (2) the tumbler and striker in one; (3) an ejecting lever; (4) sear-spring; (5) a tumbler pivoted; (6) the extractor; (7 and 8) tumbler and sear pivots; (9) sear-spring pin; (10) sear-spring pin.

the consensus of opinion is now in favour of the top-lever form of breech-action in one of its several varieties. With the lever on the top of the breech, it is possible to carry the gun in any safe manner without catching or displacing the lever. The sportsman cannot be mistaken as to the gun being properly fastened, whilst its position and short horizontal travel to the right make it the handiest, as well as the easiest, to manipulate.

There are many forms of breech mechanism actuated by the top-lever. The most common is that known as the double-bolt. This bolt travels in a longitudinal slot in the breech-action body, and engages with the lump on the barrel by entering two notches cut one into each division of the under lump. Occasionally it is made to engage with one only, that nearest the breech, which is a single bolt; and in some special guns the lump projects rearward from beneath the barrels, in order to form a better and stronger bearing for the holding-down bolt. As may be inferred, this form of breech mechanism serves to hold the barrels down upon the bed of the breech-action body, but does not in the least secure the breech ends of the barrels to the face of the standing breech.

The firing of every charge exerts the greatest strength in a line with the barrels. The tendency is towards the barrels and standing breech being forced asunder, and consequently the two should be bound together as solidly as possible. Unless

provided with some specially designed mechanism, the gun on every discharge will open at the joint, through the springing of the metal of the breech-action body, which cannot be made of sufficient strength and substance to prevent this movement, although the better the metal and construction the less is the gaping. Every gun provided with a holding-down bolt only will, as a result of wear, gape permanently at the breech, and longer use will increase the gaping until it becomes absolutely dangerous to use the gun.

Many contrivances have been invented to prevent this gaping, the following being probably the one most generally adopted.

A doll's-head, or frustrum of a cone, reversed and attached by a narrow neck to the upper rib of the barrel, and acting as a dovetail when dropped into a mortise in the standing breech. This system is applied to many of the cheaper guns; that shown is (*see* Plate II.) a cheap but strong gun of excellent shooting qualities, designed specially for American, Canadian, and Australian sportsmen. It has rebounding locks, low hammers, and is choked on Greener's method. The value is put into the barrels, locks, and shooting, and the finish, although substantial, is quite plain. The list price is about £9. Another system of breech-fastening is shown in the next illustration. The "Trap Gun" is very similar in construction to the one described, but has a third bolt in the extension, or doll's-head.

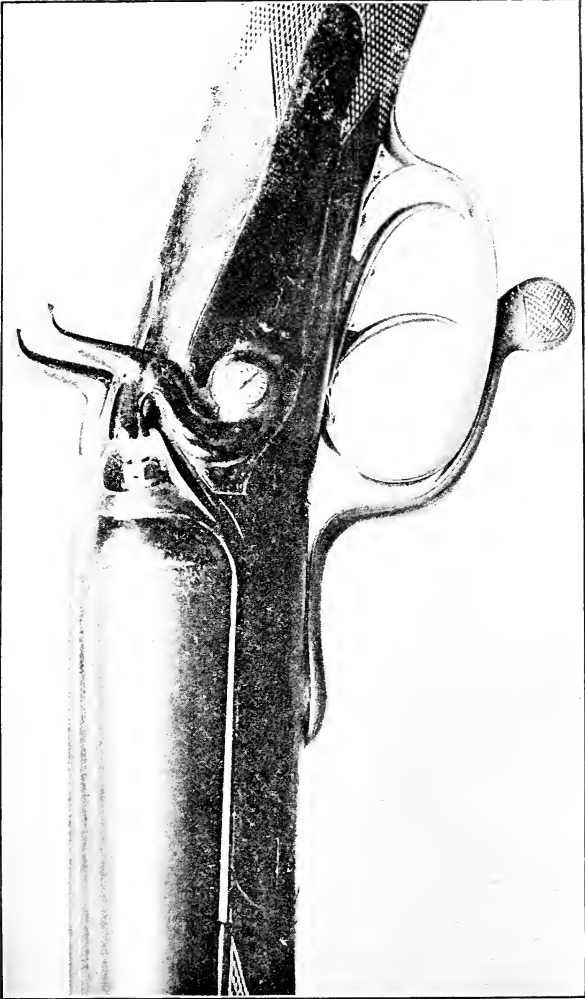


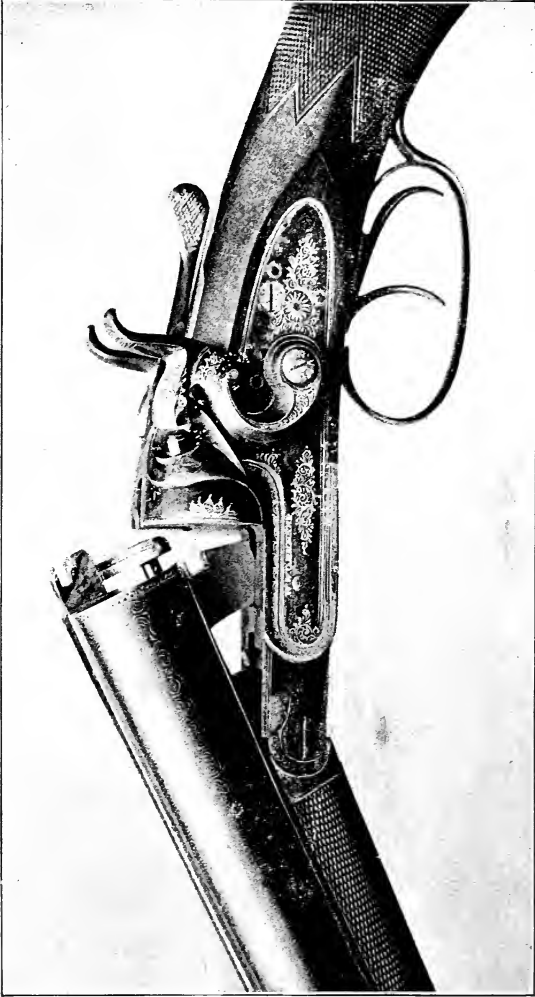
Plate I.

DOUBLE-GRIP BACK-ACTION GUN.

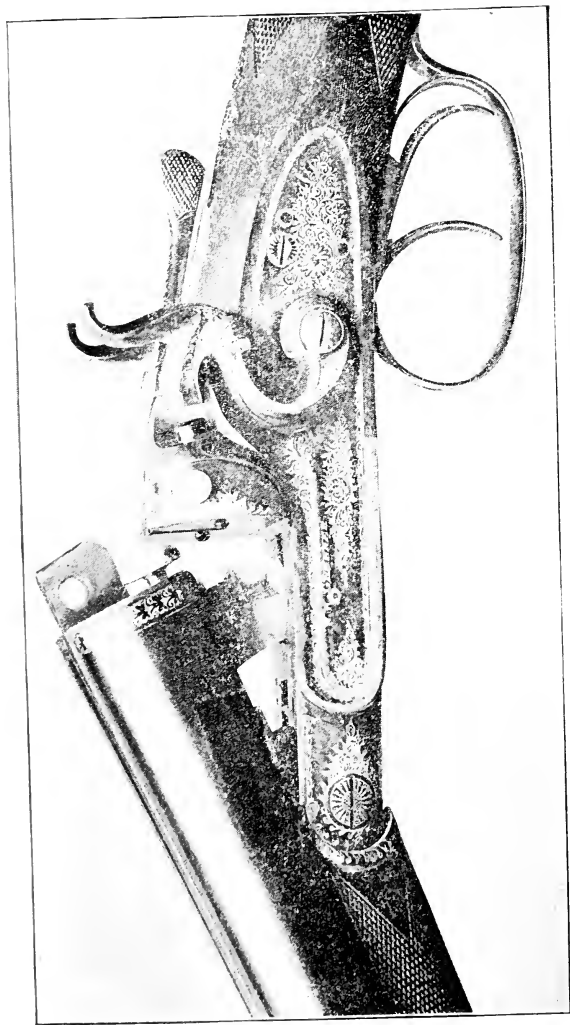


Plate II. THE DOMINION GUN. (*Specially designed for American, Canadian, and Australian Sportsmen.*)





THE TRAP GUN (NEW MODEL), (W. W. Greener's "Trap" Gun.)

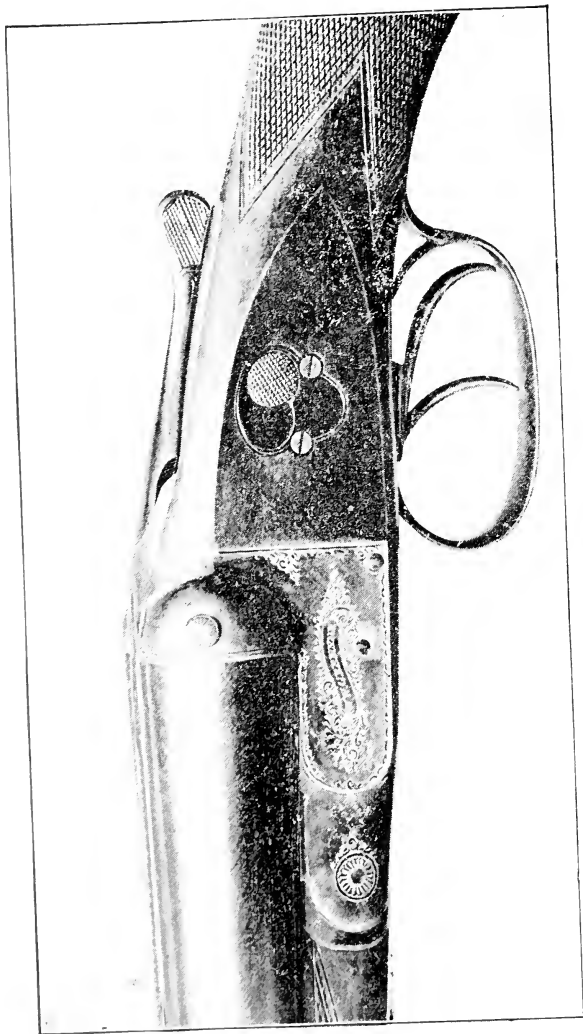


GREENER TREBLE WEDGE-FAST HAMMER GUN.

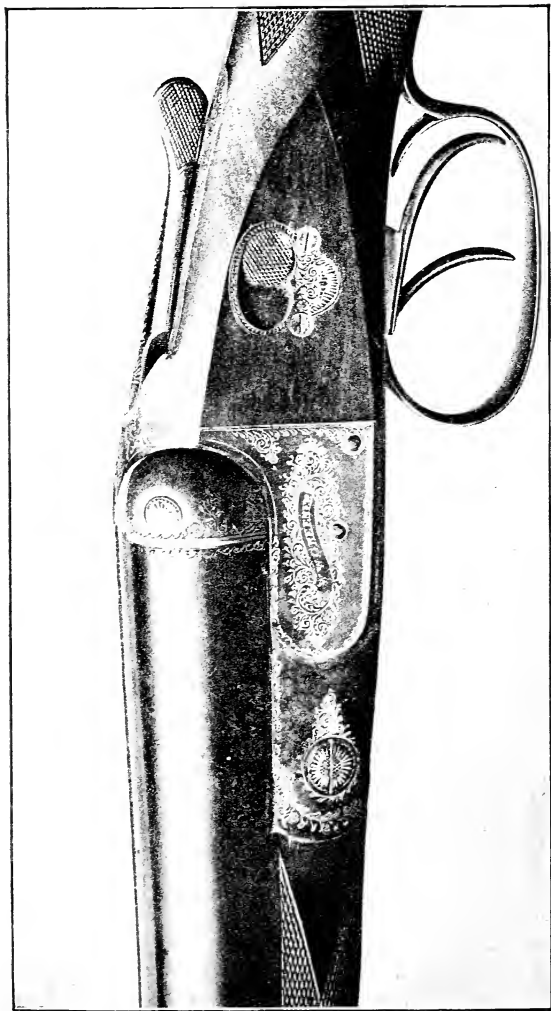


Plate V.

W. W. GREENER'S HAMMER GUN.

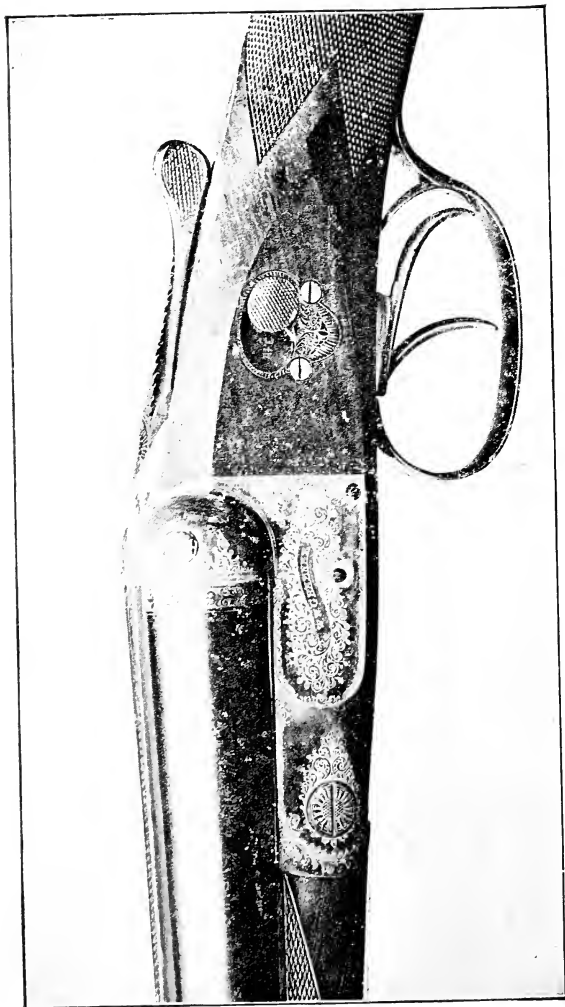


THE FORESTER HAMMERLESS GUN.



GREENER'S HAMMERLESS GUN.

Plate VII.

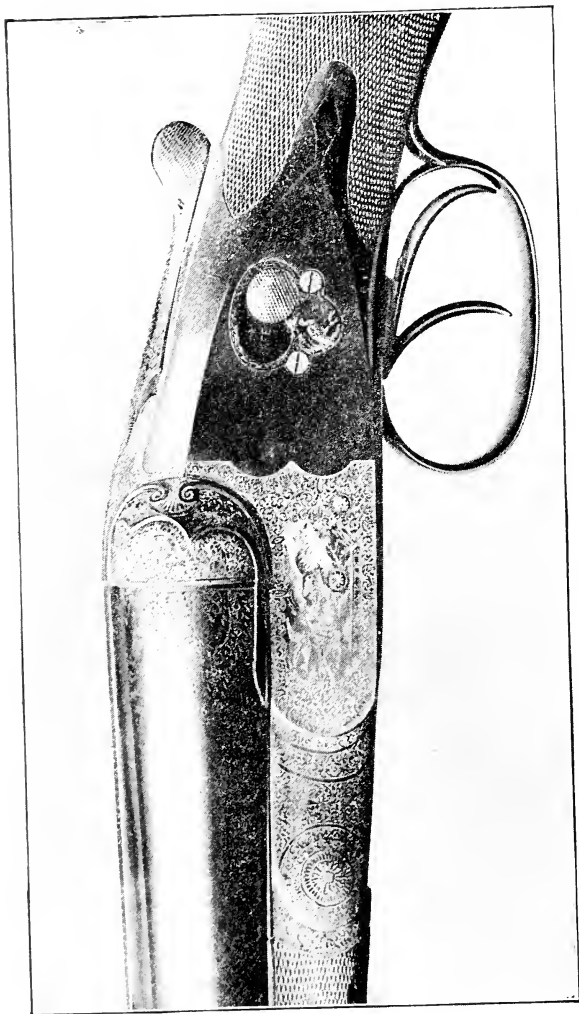


W. W. GREENER'S HAMMERLESS GUN.



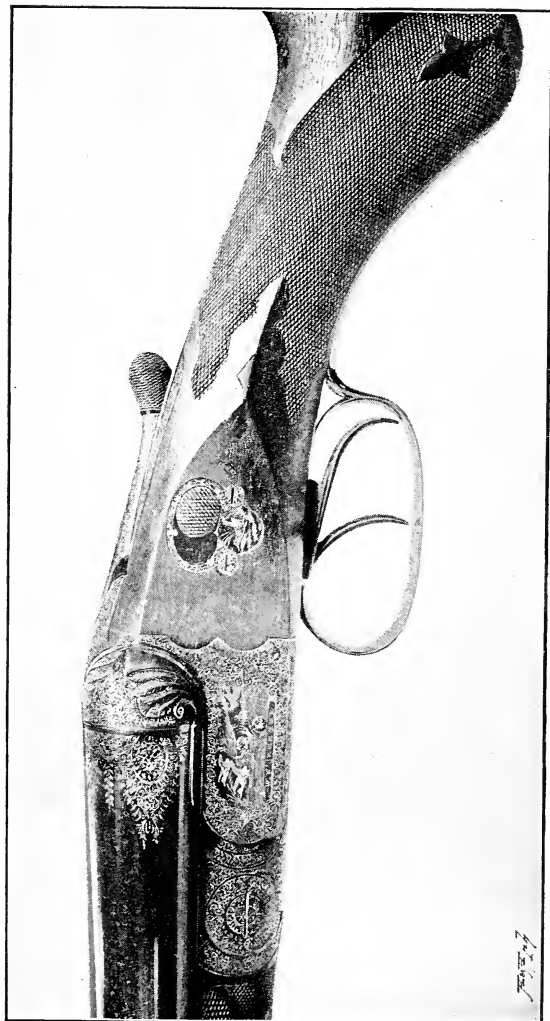
Plate IX.

BEST QUALITY HAMMERLESS GUN.



GREENER'S "SOVEREIGN" HAMMERLESS GUN.





FAC-SIMILE OF ONE OF W. W. GREENER'S EJECTOR GUNS.

Plate XI.



THE "SELF-ACTING EJECTOR" GUN.

The gun is tastily engraved and finished, and has all the recent improvements applicable to hammer-guns. The shooting of each gun is guaranteed. The price is 10 guineas (Plate III.).

Several forms of engaging-bolt are used in connection with the doll's-head, but a better plan than all is to make the projection a plain one, and drive through it transversely a round steel wedge-bolt, which will secure the breech-action body and barrels together in the most effective manner it is possible to devise.

The well-known expert, "One who has Fired some 20,000 Shots à Marks," wrote to *The Field* that "in my opinion Mr. W. W. Greener's treble-wedge-fast cross-bolt action is by very far the strongest, the most durable, and consequently the best action that has ever been produced;" and as this opinion was endorsed by the late Mr. J. H. Walsh ("Stonehenge"), and every expert of standing, it may be accepted as the consensus of practical opinion.

The lock mechanism, in so far as guns with hammers are concerned, resolves itself practically into a question of taste. The bar, or front-action lock (Plate II.), is the one generally preferred, as it does not weaken the stock to the extent the back-action lock (Plate I.) and the back work-bar lock do, and it is by many considered the most elegant form of gun.

The front - action lock may weaken the

action to a dangerous extent if the gun is improperly made, but, as already stated, a properly made cross-bolt action is the strongest part of any gun, and with this form of mechanism bar-locks may be used advantageously.

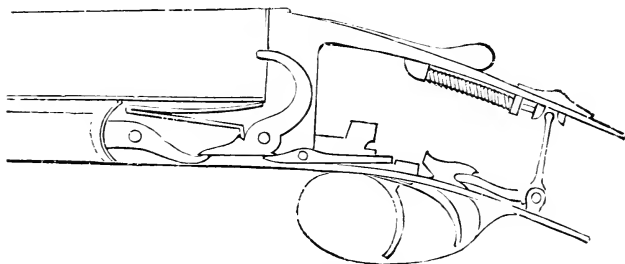
Plate IV. is a facsimile representation of a hammer-gun of medium quality, costing about 25 guineas, and made on Greener's treble-wedge-fast system of breech-action.

Plate V. shows a superior quality gun, value about 45 guineas, of the same system.

This form of breech-action is applied to guns with hammers, at prices ranging from 13 to 55 guineas ; also to hammerless guns and ejectors, as hereafter described.

In the hammerless guns the firing mechanism, instead of being arranged outside the gun, consists of fewer pieces, all contained within the breech-action body. The hammerless systems are legion ; they date in the present breech-loading central-fire form from 1860 ; but Mr. Murcott's gun, patented in 1871, was the first to become popular. The locks were cocked by the lever used to actuate the holding-down bolts of the breech mechanism, and four years after its introduction its successor, the barrel-cocker, was patented by Messrs. Anson and Deeley, the inventors. Instead of using manual force to compress the mainsprings, and cock the locks, the weight of the barrels when falling to load is utilised to raise the lock to full cock by means of

levers pivoted on the same centre as that upon which the barrels are hinged, and turning with them. These cocking-levers engage with the arms of the tumblers (or hammers), extended forward for that purpose. The lock mechanism, tumbler springs, sear, etc., is of the simplest and strongest design,



Anson and Deeley Hammerless, showing Lock Mechanism and Trigger Bolting Safety.

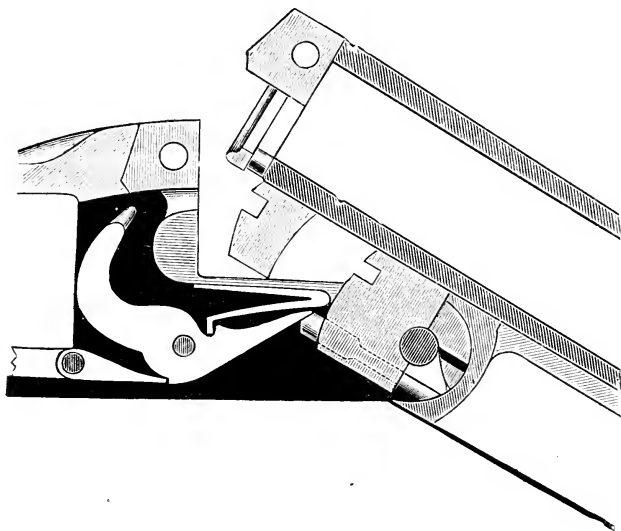
and is arranged in slots cut in the breech-action body beneath the barrels. The Forester hammerless gun (Plate VI.) has mechanism on the above-described principle. It will be seen that the shape of the body has been altered to give it a neater appearance than formerly. The cocking-dogs have also been redesigned, to permit of the gun being put together without having first to cock the locks. It has also the additional advantage of Greener's Treble-Wedge-Fast action, and the barrels are choked on the author's principle. Such guns are listed at 14 guineas. A similar gun, but with old

shape action, and quite plainly finished, is supplied at one guinea less, and is the cheapest hammerless gun made by the author. Of the various modifications of the Anson and Deeley, that improved form, known as W. W. Greener's *Facile princeps* mechanism, is the best known and most popular. There is in this no cocking-dog, but the forward ends of the tumblers are turned in, and engage with either a cocking-swivel pivoted in the under lump of the barrels, or by a sliding-rod abutting against the iron of the fore-part, and working in the barrel-lump and turning with the barrels.

The Plates Nos. VII., VIII., and IX. illustrate Greener's hammerless guns with the *Facile princeps* mechanism, and are listed at 20, 25, and 40 guineas respectively. Other qualities are obtainable from 16 to 60 guineas, but the three shown are chosen as being the most popular qualities, and as best exemplifying the difference in design and finish of the cheap and more expensive weapons.

In the accompanying woodcut the mechanism of the *Facile princeps* system is fully illustrated. It will be observed that it possesses fewer parts than any other well-known hammerless gun; that all the limbs are solid and strong, and, being properly placed, all work in perfect harmony, and with the greatest ease to the user of the gun. The mainsprings are heavy, which ensures freedom from miss- and hang-fires, yet the weight of the barrel is sufficient to cock the locks. The balance is good,

and guns on this system, light, strong, and of graceful outline. The treble-wedge-fast breech-



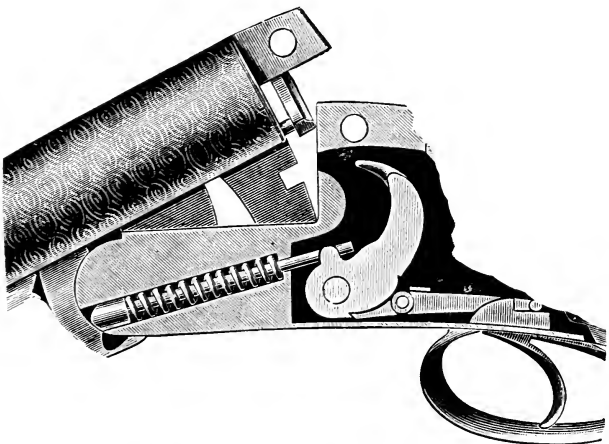
Mechanism of *Faci'e princeps* Hammerless.

action is applicable to, and always used in connection with, this principle.

Some guns on the hammerless system are made with the lock-work arranged upon, and affixed to, side lock-plates, similar to those of a hammer gun. It is claimed for these locks that they permit of the mechanism being readily inspected; but there would seem to be no advantage in this, providing the mechanism works well without constant

inspection or frequent repairs, and the alternative method of arranging the mechanism in slots within the breech-action body has advantages which greatly outweigh those claimed for the detachable locks.

A weakness of several barrel-cocking mechanisms lies in the fact that a very short breech-action



Coil-spring Mechanism for "Sovereign" Hammerless Guns.

body is necessary to their successful working. The coil-spring lock mechanism was produced in order to obtain a gun breech action with a body of extra length, and at the same time more simple guns with the lock-work arranged on detachable side-lock plates. The lock mechanism consists of a tumbler and scear pivoted in the



breech-action, the cocking being effected by a sliding rod, capable of a reciprocating motion, and mounted in a hole drilled diagonally from the hinge joint to the back of the body; one end of the rod is slotted to engage in a projecting stud in the tumbler, the other, having a larger diameter, forms a shoulder against which one end of the coil mainspring presses; the extremity of the rod projects through the knuckle of the action, presents an inclined and rounded nose to the back extremity of the fore-end iron; a recess is made in the fore-end iron, in which, when the tumbler is down, the cocking-rod is freed. Upon the barrels being dropped for loading, the rod is pushed backward, and the gun thereby cocked. Upon the gun being closed and fired, the rod moves forward, carrying the tumbler with it, and, having entered again the recess in the fore-end iron, it is once more ready for cocking.

More recently improvements have been made in the lock-work of the Anson and Deeley and other hammerless systems, and in the breech-locking mechanism used, so that an extra long body may be used, and the **V** main-spring retained. The coil spring is inferior, being less certain in action.

The illustration (Plate X.) represents a W. W. Greener hammerless gun of royal quality, value 55 guineas, being the very best as regards material and workmanship. The gun is most tastefully

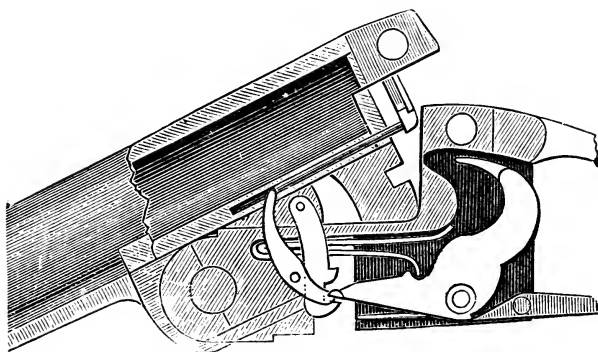
finished and artistically engraved, either with scroll designs or sporting scenes, the finish, balance, build, and style are perfect.

There are also guns which rebound to full cock, and by closing the barrels the extra pressure requisite to give the downward blow is given to the opposite arm of the mainspring. There are also guns which are normally at full cock, and require pressure to be put on the mainspring by other leverage—such as gripping the gun for firing before the lock can fire; but neither of these principles can be recommended in preference to those already described.

Modern guns of the highest class eject the fired cases, throwing them clear of the gun immediately it is opened if they have been fired, withdrawing them a quarter of an inch or so only if they are loaded. A separate extractor is used for each lock; the tumbler of each lock, when the trigger is pulled and it is freed, falls into such a position that the extractor mechanism will engage with it as the gun is opened, and the fired cartridge be thrown clear of the gun. This is the principle of the double ejector gun, the idea of which originated with Mr. J. Needham; and the principle has been adopted by all makers of ejecting guns, though the modification of the Needham mechanism, as improved by Mr. W. W. Greener, remains the simplest and most perfect form of self-acting ejector.

The cocking mechanism of the W. W. Greener

automatic ejector is substantially the same in principle as that of the *Facile princeps* already described, but the cocking-swivel is furnished with a stud, situate about midway between its extremities, and immediately beneath this stud the lower extremities of the ejecting levers are arranged so as to project. Presuming that the gun has been fired, the action is as follows:—On



Mechanism of Greener's Ejector.

opening the barrels, the tumblers are raised by their turned-in extremities bearing on the additional stud of the cocking-swivel; when raised nearly to full cock they slip past this stud, and fall sharply on the lower arms of the ejecting levers, and the extractors, already withdrawn by the usual extracting mechanism to the ordinary extent, are violently propelled to their full extent by the force

of the blow, and the empty cases are flipped out. If one cartridge only be fired, the other lock remaining at cock does not engage with the cocking-swivel or put the ejecting mechanism in motion; consequently, unfired cartridges are withdrawn to the ordinary extent in the usual manner. The available power for ejecting the fired case is that of the mainspring falling; the mechanism effects the ejection perfectly.

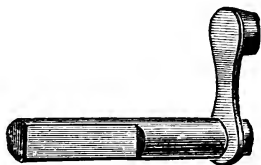
This gun requires most careful adjustment, and although the parts are few, simple, and very strong, to ensure their perfect working the utmost precision is necessary in centring, shaping, and adjusting the various limbs. The gun can be made by highly-skilled workmen only, and must necessarily be of the best quality throughout.

The prices range from 30 guineas, to the Royal quality at 60 guineas, and, for special presentation or exhibition, the Imperial quality, at 85 guineas. A gun of this type is illustrated in Plate XI.

Plate XII. represents a 35-guinea quality Greener Self-Acting Ejector Gun.

Another form of ejector is that in which a separate lock mechanism is provided to effect the ejection of the fired cases. The two best known of this type are the Dceley and Perkes ejectors, in which the additional lock mechanism is placed in the fore-part of the gun, and consists practically of a second lock, with hammer, scear, mainspring, scear-spring, etc., which is cocked by the action of

closing the gun, the tumblers of the ejecting lock being carried back to cock by the extractor legs; the force required to accomplish this is considerable, and the closing of the gun consequently hard. When the gun is fired the "travel" of the main-spring is utilised as an automatically acting trigger to release the sear of the ejector lock, and leave it free to act by its tumblers striking the leg of the extractor upon the gun again being opened.



Greener's Trigger Safety.

Of the other parts of a gun's mechanism it will be necessary to refer to one only. Hammerless guns and some hammer guns are provided with safety bolts. The object of these mechanisms is to protect the shooter and others from the consequences of an accidental discharge. They are of various kinds: some act automatically, others require to be moved on and off by the user of the gun; some lock the tumblers, some the sears, and some the triggers. A well-made hammerless gun is safer than a gun with hammers—that is to say, it is not so liable to accidental discharge as the hammer gun;

consequently, the necessity for safety bolts is not apparent. To make doubly sure, a self-acting bolt, which, by means of a spring, "intercepts" the tumbler or hammer, should it be jarred from cock, is often provided; when the trigger is pulled, it also is moved, and the tumbler, instead of being caught by it, is free to reach the cap or striker. A second sear, acting quite independently of the primary sear, effects the same purpose.

It is also usual to provide a bolt which locks the triggers so that they cannot be pulled. This should be independent—that is to say, it should not be so arranged as to automatically lock the triggers every time the gun is opened. Such an article is a nuisance, and lessens the advantages of the hammerless gun. A safety, such as that illustrated, which bolts the triggers effectually, and is easily put on and off with the thumb, is much better than a safety on the top of the break-off or grip of the gun, as illustrated in the A. and D. Hammerless, for these all weaken the gun-stock, some very considerably, at its weakest point. Those which are worked by a spring to put them on and off automatically by gripping the gun are likely to get out of order, and not be "on" when it is expected that they are. They also prevent one from carrying the gun with comfort.

When putting a hammerless gun away, it is advisable to lower the tumblers by pressing the triggers when the gun is open and gently closing the gun.

With an automatic safety this is impossible, as the triggers are bolted when the barrels are open, and cannot be released until the gun is closed.

#### STANDARD WEIGHTS, LENGTHS, AND LOADS.

*Large-Bore Guns for Wild-Fowling.*—Guns of the largest calibre which can be fired from the shoulder are usually made single barrel and of 4-bore, the average diameter being 1.052 inch. There is a 2-bore paper case made by Messrs. Eley Brothers, Limited, but the calibre is practically that of the 4-bore thin brass case. The cases do not hold a larger charge, nor do the guns shoot better, if so well, and the cartridge-case has not the advantage of being so perfectly water- and damp-proof as that of brass; therefore, the 4-bore gun for brass cases is that recommended.

These large guns are made in four styles of breech-loading, the mechanisms being, first, the cheapest, with double-grip lever under guard, back-work lock, and outside hammers; second, the treble-wedge-fast, with top cross-bolt, top lever, bar lock, and outside hammers; third, the treble-wedge-fast top cross-bolt, hammerless mechanism; fourth, similar breech mechanism, but with the addition of self-ejecting lockwork. The gun should weigh from 15 lbs. to 18 lbs., the barrels being 42 in. to 46 in. in length, as fully choked as possible, to obtain the best results, with charges varying from nine to ten drams of powder, and  $3\frac{1}{4}$  to  $3\frac{3}{4}$  ounces of shot.

Strong serviceable guns, with first-class shooting, can be had with the cheapest form of breech-action for twenty guineas, or with Treble-Wedge-Fast action from twenty-five guineas, Hammerless from thirty guineas, and Ejectors from forty guineas.

Double-barrel 4-bores are occasionally made, and with 42-inch barrels weigh about 20 lbs., and cost, with Hammers, 40 guineas, and Hammerless, 45 guineas; but on account of the size and great width across the breech, are considered cumbersome and awkward to handle. For this reason they are rapidly being superseded by the more handy and much lighter 8-bore, which, when properly constructed, chambered, and bored specially for the brass cartridge case, is capable of firing a charge of 3 ounces of shot.

Double 8-bores may be divided into three classes:—

The “Magnum,” weighing about 15 lbs., having barrels 36 inches long, chambered for the  $3\frac{3}{4}$ -inch “Perfect” case, and firing a charge of 7 drachms of powder, with  $2\frac{3}{4}$  to 3 ounces of shot. Such a gun is suitable for use from a boat, or from behind a screen, being too heavy for carrying any distance. It is, however, with this style of gun that the best patterns are made, the usual standard being 90 to 100 pellets No. 1 shot in a 12-inch selected square, at 40 yards, or an average of four pellets to the square foot on a four by three foot square target at 100 yards.



The "Medium" 8-bore has barrels two inches shorter, and weighs from a pound-and-a-half to two pounds lighter, but giving results nearly equal to the above. The usual charge is 6 drachms powder, with  $2\frac{1}{2}$  to  $2\frac{3}{4}$  ounces No. 1 shot, which should give a pattern of about 80 in the 12-inch square, at 40 yards.

The light 8-bore, with either 30- or 32-inch barrels, weighing 11 lbs. and 12 lbs. respectively. It should be chambered for the  $3\frac{1}{4}$ -inch perfect case, to fire  $2\frac{1}{4}$  to  $2\frac{1}{2}$  ounces of shot with same charge of powder, making a pattern of about 75.

All 8-bores should be full choke. Thin brass or "perfect" cases are recommended in preference to all others for both 4- and 8-bores, as these cases being of larger bore internally than the paper cases—although nominally the same—take the large charges better, and will be found to give the best results. Also, being thin, they crimp easier.

Cheap 8-bores should be avoided; many light and inferior weapons are offered, the shooting of which will not equal a good 12-bore, even though double the charge of shot may be used. It is not merely the size of the bore which gives superior shooting. Everything must be in proper proportion, and the boring must be most skilfully executed to obtain the high patterns here recorded.

The pattern of 8-bores, as well as all other sporting shot-guns, are tested at 40 yards, this

distance being more convenient than a range of 100 yards ; and it may be taken for granted, if the selected 12-inch square of the pattern at 40 yards contains 85 to 90 No. 1 pellets, the shooting at the longer distance (100 yards) will equal  $3\frac{1}{2}$  to 4 to the square foot. Further, it is difficult to place the charge central at distances above 80 yards, and therefore a defective aim would give a wrong idea of the shooting capabilities of the gun.

It is considered by some no test to plate an 8-bore at 40 yards, but, from a gunmaker's point of view, it is the most useful range, since he is able to compare the results obtained with all other bores. He knows that if he is able to make an 8-bore shoot No. 1 shot in a better proportion than a 12-bore full-choke pigeon gun does No. 6, he has a good shooting 8-bore, and until it will make such a pattern at 40 yards it is only wasting powder and shot trying it at any longer ranges.

The number of pellets contained in an ordinary 12-bore pigeon load is 340 (being  $1\frac{1}{4}$  oz. No. 6 shot, 270 to 1 oz.), and the utmost pattern obtainable from it at 40 yards is an average of 260 in a 30-inch circle ; while that of an 8-bore, when using  $2\frac{1}{2}$  ozs. of No. 1 shot (260 pellets), is about 220 pellets, which is a far better proportion of the charge than 260 No. 6 with a 12-bore.

Sportsmen wishing to test their 8-bores should first do so at 40 yards ; if they find the results below a certain standard it is useless to prosecute

their experiments further. Several 8-bore guns, constructed for the paper cases, and by high-class makers, have recently been sent to the author for testing and to improve the shooting; upon trial the results given were far below the usual standard of what an 8-bore should do. In some instances the shooting first obtained was very little better than a 12-bore firing only  $1\frac{1}{2}$  oz. of shot.

The following notes form a short *résumé* of some experiments carried out recently by "Fleur de Lys," the results of which were published in *The Field* and *Land and Water* in February and March, 1894.

The gun used throughout the trials was a double-barrel 8-bore by W. W. Greener, weighing about 15 lbs., 36-inch barrels, chambered and constructed for perfect cases.

With  $6\frac{1}{2}$  drs. No. 4 Alliance powder,  $2\frac{3}{4}$  ozs. No. 1 shot, average on target 4 ft.  $\times$  3 ft., at 100 yards, 40 pellets= $3\cdot3$  to square foot; 7 drs.  $\times$  3 ozs. No. 1 at 100 yards= $\text{about } 4$  to square foot;  $6\frac{1}{2}$  drs.  $\times$   $2\frac{1}{2}$  ozs. No. 4 at 80 yards, average  $127=10$  pellets per square foot on target; 7 drs.  $\times$  3 ozs. No. 4 shot average in 30 in. circle at 80 yards,  $57=11\frac{1}{2}$  to square foot; 6 drs.  $\times$   $2\frac{3}{4}$  ozs. No. 1 at 80 yards, average in 30-inch circle  $53=10\frac{1}{2}$  to square foot; 6 drs.  $\times$   $2\frac{1}{2}$  ozs. No. 1 at 80 yards, average in 30-inch circle  $48=9\frac{1}{2}$  to square foot; 6 drs.  $\times$   $2\frac{3}{4}$  ozs. No. 1 at 60 yards, average in 30-inch circle 130. At 40 yards with 6 drs.  $\times$   $2\frac{1}{2}$  oz. No. 1,  $2\frac{1}{2}=90$  to

97 in selected 12-inch square ; with 7 drs.  $\times$  3 ozs. No. 1 an average of about 100 was obtained.

Many advantages are gained by the use of Nitro powders in 8-bore guns, among the chief being less smoke, less report, less flash, but, more especially, less recoil than developed by the black powders. Guns intended for use with Nitro powder only, can be made considerably lighter than the weights given in this chapter as standards. The reduction might be from  $1\frac{1}{2}$  to 2 lbs. for the Magnum, and 1 lb. for the light 8-bore. It is simply a matter of recoil, and for this reason guns intended for large charges of black powders are built heavy. There would be ample strength in a Magnum 8-bore—made as it should be—weighing only 13 lbs. to withstand any charge of black powder possible to get into the case, but the recoil produced would be much too severe for the average wild fowler.

What is the greatest killing range of an 8-bore gun? is a question frequently asked through the columns of the leading sporting journals. It invariably brings forth numerous replies and opinions.

“Fleur-de-Lys,” although, perhaps, going beyond most people, states in his letters to *The Field*:—“I am of opinion that with No. 1 shot a good 8-bore (equal in powers to the Greener used in my trials) if held straight, is certain of a duck at 80 yards ; that is to say, I think ten or eleven would be bagged out of twelve shots. With

the gun in question, at 80 yards a flying duck would receive on an average three to four pellets of No. 1 shot, and a sitting duck two to three pellets."

With this opinion, which is the outcome of many experiments, the author agrees.

It should be noted, with regard to the wadding employed in 8-bore cartridges, that an extra Field wad or two between the powder and shot may be used with advantage, if with the usual loading the charge does not fill the case to within  $\frac{1}{4}$  inch from the top. The pattern will be improved considerably by their use. After numerous experiments, extending over many years, the author has proved that No. 4 Alliance powder is most suitable for 8-bores, giving the best patterns and penetration, although No. 6 and No. 7 give less recoil. For the minimum recoil, Schultze or E.C. powder is recommended.

The loads recommended by "Fleur de Lys" are:—"For ducks and widgeon up to 60 yards, No. 4 shot; beyond 60 yards up to 100, No. 1 or No. 2 shot. Beyond 100 yards I think the chances of a successful shot are problematical, and therefore I believe in big shot, BB for an 8- or 4-bore, so that if a bird is hit it receives such a crushing blow that it is killed outright, or completely crippled, and can be easily gathered.

"For plovers, small waders, etc., No. 4 up to 80 yds.; No. 1 or 2 beyond.

“Never anything bigger at these birds, as they are easily killed.” (*See also* pages 369 *et seq.*)

*Small-Bore Duck Guns.*—A 12-bore can be made from which excellent shooting is to be obtained when using  $3\frac{1}{4}$  to 4 drs. of powder with  $1\frac{1}{2}$  ozs. of shot: such a gun must be purposely built to give even moderately good results. It should be from  $7\frac{1}{4}$  to 8 lbs. in weight, and constructed for either  $2\frac{3}{4}$  or 3-inch cases, and bored expressly to give the best possible results with the above load of shot, and of any size shot from No. 5 to buck-shot.

Such a gun is particularly suitable for firing  $1\frac{1}{2}$  oz. of shot. It will not shoot  $1\frac{1}{4}$  oz. equal to a pigeon gun, but far excelling it with the larger load.

For all-round shooting it is a most useful weapon, as it is capable of shooting any charge of shot from  $1\frac{1}{8}$  to  $1\frac{1}{2}$ . As a good modified with  $1\frac{1}{8}$  to  $1\frac{1}{4}$  oz. shot, and as an extreme choke with  $1\frac{1}{2}$  oz., its own special load; it also will be found an excellent shooting gun with buckshot.

The 10-bore has been for some years the favourite size for a duck gun, and regarded as the best size for the wild winged game of America. Of late it has fallen out of favour, and it is remarkable how quickly the 12-bore is supplanting it in the United States. The common type of 10-bore was 10 lbs. or more in weight, with 32-in. barrels, and was used with a charge of 5 drams of powder and  $1\frac{1}{4}$  oz. of shot: a charge in which the quantity of

powder is out of proportion with that of the shot used. The most generally useful type of 10-bore is that of  $8\frac{1}{2}$  lbs. to  $9\frac{1}{2}$  lbs. in weight, firing either brass or paper cases, and using as the standard charge 4 drams of powder and  $1\frac{1}{2}$  to  $1\frac{3}{4}$  oz. of No. 4 or larger size shot. Such advantages as the 10-bore possess are obtained from the use of large-size shot; for use with small shot, a 12-bore of  $7\frac{1}{4}$  lbs. or so, and loading  $1\frac{1}{4}$  oz. only, is quite its equal. 10-bore guns cost £1 1s. more than 12-bores of the corresponding styles and qualities.

*The Standard Size for Game and Trap.*—With  $4\frac{1}{4}$  drams, and  $1\frac{1}{2}$  ozs. of No. 2 shot, pattern in 30-inch at 40 yards, 160 pellets; penetration, 25 sheets of strawboard. Same charge, distance, etc., but No. 1 shot, pattern 135, penetration 31 sheets of strawboard. At 60 yards, No. 4 shot, the pattern should average 65, and penetration be 18 sheets; with No. 1 shot, the pattern 50, the penetration 26 sheets.

The 12-bore gun is, and in all probability ever will be, the standard calibre. The ordinary game gun of this bore should not weigh more than  $7\frac{1}{4}$  lbs.

The favourite pigeon gun for trap shooting is just under 8 lbs. in weight, and has 30 in. barrels, chambered for  $2\frac{3}{4}$  in. cases, and regulated to shoot a charge of  $3\frac{1}{2}$  drams and  $1\frac{1}{4}$  oz. of shot, and when choked to the fullest is a perfect weapon for a strong man whose handicap distance is thirty yards. This style of gun is used by Captain Brewer, who in one match fired at 250

birds, and his opponent, who made the highest score on record (199-200), used a gun  $\frac{1}{2}$  lb. lighter, but in other respects similar. The  $7\frac{1}{4}$  lb. gun of this bore should have 30-in. barrels, chambered for the ordinary paper cartridge case,  $2\frac{9}{16}$  in. long. The standard load will be 3 drams and  $1\frac{1}{8}$  oz. of shot, which may with advantage be increased to  $3\frac{1}{4}$  drams and  $1\frac{1}{8}$  oz. when birds are wild. The gun should also shoot well with  $3\frac{1}{4}$  drams and  $1\frac{1}{4}$  oz., a load suitable for pigeon shooting. The 12-bore can be made with 30-in. barrels, 7 lbs.,  $6\frac{3}{4}$  lbs., and even  $6\frac{1}{2}$  lbs. in weight. If so light as  $6\frac{1}{2}$  lbs., one barrel should be cylinder or only modified choke. With 28-in. barrels,  $6\frac{1}{2}$  lbs.,  $6\frac{1}{4}$  lbs., or 6 lbs.; with 27-in. barrels, as light as  $5\frac{3}{4}$  lbs.; and with still shorter barrels the weight can be proportionately lessened.

Longer barrels than 30 inches are occasionally made, but experiment shows that no advantage is gained either in pattern or penetration by their use.

In the Cape 36-inch barrels are very common, and are specially suitable for use from horseback, the object of extra length being to get the muzzles well clear of the horse's head.

A gun-barrel, to be in proper proportion to the bore (according to the early gunmakers), should be 40 diameters in length. This same rule applies to-day, and if followed will prove the most satisfactory, both as regards shooting and handiness.

Guns of 12-bore are made of every quality. A sound serviceable gun may be obtained for £10, or



if hammerless, from about £15. Fine guns and ejector guns cannot be purchased under £30. The ordinary type of gun, of reliable quality throughout, well made, and fitted well, costs about £25. The reason for the difference in prices and qualities is more fully explained in the succeeding chapter on the choice of a gun.

#### GUNS FOR BUCKSHOT.

A special gun is required to shoot large shot of three, four, or five to the layer, with the best results, and such guns of 12-bore, if correctly constructed, will shoot at long ranges with such force and accuracy that they may with advantage be substituted for rifles for small deer shooting.

The following is an extract from a letter which appeared in *The Field* on February 15th, 1887, and will convey an accurate idea of the nature and power of a true buckshot gun:—

“Mr. Greener sent me a No. 12 hammerless gun—30 in. barrels, weight  $7\frac{1}{2}$  lbs.—which I received last June. It has more than met my most sanguine expectations, and fully verified my opinion, not only shooting buckshot with the certainty of killing a deer from 100 to 150 yards, but also proving a remarkable shooter with small shot.

“During the past summer I only got shots at six deer, killing each shot. The longest shot was 91 yards, the deer being struck with three shot, one breaking the back, and the other two just below.

I shot too high, the deer being in the act of leaping high, and the remaining six shots passed into a gum-tree above the height of the deer.

“In a number of trials at a 30-in. circle, from 100 to 156 yards, not a shot was fired that would not have killed a deer. At the distance of 156 yards a shot made by Dr. Hargrove, three shots would have entered the side of a deer.

“A number of shots were fired by John A. Skannall, Money Brian, and George Conway, gentlemen distinguished for their fine shooting. At 100 yards from five to six shots were put in the target out of a possible nine at every discharge. At 125 yards never less than four shots would have entered the side of a deer.

“At a trial made in Shreveport a number of distinguished gentlemen attended. They were sceptical as to the long range of this gun, and would not believe, unless they measured the distance, and shot the gun. They brought a tape line and measured 125 yards.

“They themselves shot my gun with results similar to what I have above stated, putting from two to three shots in less than 3-in. of the centre of a 30-in. circle at every discharge.—GEO. D. ALEXANDER.”

In a more recent trial (1894) made by Colonel Alexander with buckshot from the same gun excellent results were obtained with the equivalent to 3 drs. E. C. powder, and the usual quantity of shot—9 to the charge.

Three pellets were put into a 30-inch circle at 150 yards. This was done on two occasions by himself and friend. The other shots were so close to the 30-inch circle that Colonel Alexander expressed the belief that nearly all would have been put into the body of a deer broadside on.

*Guns of Small Bore.*—The 16-bore gun was at one time a favourite size with Continental sportsmen, who now for the most part prefer the 12-bore, and for use in England certainly not more than one gun in every five hundred is of 16-bore. The 16 calibre has been proved to shoot as strong as the 12, but the killing circle is less, and, moreover, not being in such general use as the 12-bore, it is not always so easy to procure cartridges in out-of-the-way places, or, in the event of running short, of borrowing a supply of a friend. The standard weight for 16-bore was  $6\frac{1}{2}$  lbs.; and the barrel, 30 inches in length, regulated to shoot  $2\frac{3}{4}$  drams and 1 ounce of shot, or with 28-in. barrels,  $6\frac{1}{4}$  lbs., but 6 lbs. is now considered to be quite heavy enough for any 16-bore, with 28-in. barrels. The one advantage of the 16-bore is its lightness, and when built in the same fashion as the miniature 12-bores, they may be  $5\frac{1}{2}$  lbs., with 28-in. barrels;  $5\frac{1}{4}$  lbs., with 27-in. barrels, and about 5 lbs., with barrels as short as 26 in. The lightest 16-bore the author ever made had 25-in. barrels, and weighed 4 lbs. 11 oz. only.

The 20-bore has been strenuously advocated by

writers in the sporting papers, but there are very few sold—the proportion is perhaps one 20-bore to twenty of 16-bore. The 20-bore should not have barrels longer than 28 in., nor should it be heavier than  $5\frac{1}{4}$  lbs., and the full standard load is  $2\frac{1}{4}$  drams and 1 ounce of shot. They can also be made 28-in. barrels, 5 lbs.; 27 in.,  $4\frac{3}{4}$  lbs.; 25-in.  $4\frac{1}{2}$  lbs.; and so on in proportion.

In the 1875 Gun Trials, W. W. Greener's gun was first in the class for 20-bores with a gun using only  $2\frac{1}{8}$  drams of powder and 1 ounce of shot, beating in both pattern and penetration heavier guns shooting larger charges. A frequent error, and one which is of importance, is the overloading of small-bore guns, for sportsmen overlook the point that the gun does not fail to kill owing to a lack of penetrative force, but because the pattern is not sufficiently close. With moderate charges the penetration of any well-bored gun is sufficient.

The 28-bore was brought prominently into notice by "Young Nimrod," the boy-shot, who, before he was in his teens, did wonderful shooting with a little 28-bore gun made for him by W. W. Greener. It may be judged how tiny was this young expert when we say that the stock measured only  $11\frac{1}{2}$  inches from the fore-trigger to the butt. The 28-bore is loaded with  $1\frac{1}{2}$  drams and  $\frac{3}{4}$  ounce of shot, No. 7 or 8 by preference, as with small shot the spread is increased; and such guns are not intended for shooting at long distances,

although Sir Frederick Millbank killed a pheasant at fifty-three yards with one the author made for him, and also killed a hare "stone dead" at thirty-four yards, the charge used being  $1\frac{1}{2}$  drams of black gunpowder and  $\frac{3}{4}$  ounce of No. 6 shot. In public matches "Young Nimrod" was placed at twenty-seven yards from the centre trap, and on more than one occasion killed thirty-eight out of fifty of the best Blue Rocks.

Small-bore guns require great care in every stage of manufacture. It is always advisable to buy them of the best makers, and it cannot be too often reiterated that cheap light guns should be avoided; and more especially is this the case with small-bores, for in them the material must be of the very best, the internal pressure exerted in the barrels of small calibre being greater in proportion than that of larger bores; and the same rule applies whatever the proportion of the loads.

*Guns of Odd Size.*—Guns of 24 and 32-bore have been made—as, indeed, have 14-bore guns; but so rarely are they made, and of such little utility are they, that they may be dismissed with the merest mention. The 28-bore is the smallest of any practical use as a game gun, but the 410 and other sizes are suited to the requirements of naturalists, and for such weapons as walking-stick guns.

*Remarks applicable to all Guns.*—The weights given, except where stated to the contrary, refer in

every case to double-barrel guns. Single guns can of course be made lighter, but there are gun-makers, with no reputation to lose and nothing at stake, who recommend 28-bores, weighing less than  $4\frac{1}{4}$  lbs., for brass cases to take loads of 2 drams and 1 ounce: in our opinion a charge altogether out of proportion to the calibre of the weapon, and the use of which may prove as dangerous as the recommendation is mischievous.

All guns from 10 to 28-bore, if properly constructed and regulated, will shoot the thin brass "Perfect" cartridge cases quite as well as they do the ordinary paper case. The chambers for the two are identical, and, although previously the author made guns with a larger bore in order to correspond with the increased internal diameter of the thin brass cases, he has discontinued so to make them for two reasons: Firstly, guns so bored shot very badly with paper cases; and secondly, the patterns obtained with nitro powders were not as good as those made with black powder.



## CHAPTER II.

ON THE CHOICE AND FIT OF A GUN—SPURIOUS, SHAM, AND SECOND - HAND GUNS — THE QUALITY, PRICE, AND MANUFACTURE OF GUNS—THE GUN THAT WILL SUIT—ORDERING BY LETTER—CHOOSING FROM STOCK.

THE choice of a gun should be determined, first, by the purposes for which it is intended to be used ; secondly, by the physique of the person by whom it will be used.

It will be preferable to preface the considerations of these particulars by some general advice respecting the purchase of guns generally.

There is, in the first place, much misconception as to the value of guns, and to the casual observer there is often no perceptible difference between a fairly good gun and a really good one ; often the experienced sportsman finds himself imposed upon as readily as the tyro. In order to distinguish a good weapon from one which appears good, it will be necessary to examine minutely into the details of its construction, and anyone who carries out the instructions given here, and will carefully observe the points indicated, need not fear to make a purchase upon his own estimate of a gun's worth.

Do not, therefore, purchase any gun without first examining it, unless from a person of whose standing you have no doubt, and who will agree to exchange the weapon or return the money, if required. The purchase of a pig in a poke is always attended with risk, which no respectable dealer or gun-maker requires a customer to run. Many advertisements of the "catch-penny" type appear in the general newspapers, and are occasionally found in the columns of the sporting press. Offers of guns at an extremely low price will not delude the common-sense man into parting with his money. Some people, in the hope of securing a bargain, get caught on the well-baited trap; less frequently the reckless advertiser is prosecuted and convicted. The following specification, copied from a gun-maker's list, is a never-failing catch:—"12-bore gun, laminated steel barrels, left choke-bored, top-lever, snap-action, purdey double bolt, extended rib, rebounding, and low hammers; patent fore-end, figured walnut, half pistol-hand stock, horn heel-plate, scroll engraving. Price, 60s." The same description might be applied to a sixty-guinea gun with as much truth. Until a sportsman knows something about guns he should purchase of a respectable maker. Even "friends" will seek to benefit by a young man's inexperience more frequently than will the dealer, who wishes to secure his custom, and looks forward towards future orders as well as to present profits.



Take first in hand the cheapest gun made for the wholesale trade. Such a gun is not usually found in a country gun-maker's shop; but it may be offered to a quite inexperienced buyer. To all appearances, the gun is as others. It has two barrels, locks, triggers, a stock well varnished, and has a new look about it, which may be mistaken for "finish." Let us examine the gun carefully. The parts, as the bed of the breech-action body and the lock-plates, which should be flat and square, are rounded, and the surface uneven and scratchy; parts, such as the knuckle-joint and the barrels, which should be round, are also uneven, irregular, and have flats upon them; the hammers are not a pair, and when placed down upon the nipples, at half-cock and at full-cock, will be found to stand parallel in one position only. In cocking the locks, one will "squeak," the other will make no sound, one striker will push outward and upwards, the other at a different, but not a corresponding, angle. The extractor may have a crooked leg, and will probably be rusty underneath. Wherever two parts come together there will be a wide joint and no close fitting. The action body barely touches the barrels. The holding-down bolt is a crooked contrivance in a crooked hole. The fore-part will drop from the gun when fired, or cannot be pulled off however gripped. The stock will show marks of file-teeth, and probably exhibit a rough open grain through the varnish or "oil finish." The chequering will be

irregular, the lines overrun, and several of the diamonds missing. The engraving will consist of ill-shapen, deeply-cut furrows and meaningless scratches, put on by the dozen with a shading-punch. The butt-plate will be of pressed rubber, and probably have a sporting design, in high relief, stamped upon it. The rib will be crooked, irregular, uneven, and probably more on one barrel than on the other, instead of midway between them. All these faults arise from the "cheapness" of the article. The work is scamped, and the gun will give no satisfaction, at whatever price it may be purchased. On trial, it may fail to go off, the striker being too short or not central. This rectified, it may be found that the other striker is too long or too sharp, so that after the gun is fired it cannot be opened. This is altered, the mainspring is so poor, its elasticity has departed, and mis-fires ensue. A new mainspring is fitted, and from the time this first new piece is fitted the old ones break in turn, until at last the barrels drop apart, owing to having been soldered with sal-ammoniac as a flux, instead of resin, and a new gun has to be purchased.

A serious danger arises from the use of too long strikers in hammer guns. The striker is so near to the hammer face at half-cock that a blow upon the hammer will discharge the gun. Very cheap guns are usually very defective in the breech-action fitting, and if this is not a source of immediate

danger, the gun being, *to some extent*, safeguarded by the compulsory proof, the mechanism will soon fail. In like manner, parts of the lock mechanism, instead of being of hardened steel, will be made of common iron, and tumblers and screws are so soft that in a very short time the heads become worn, and the hammer will not stand at cock. The danger that accrues from the use of such a weapon is so great that this cheap gun may be regarded as increasing the risks of shooting a hundredfold.

A gun, however poor in principle, if not of inferior workmanship, is worth purchasing at a price, and the quality of workmanship is indicated to the tyro by the attention paid to details: as, for instance, the proper smoothing of the iron-work, the close fitting of wood and iron, the pitch of the strikers to correspond with each other, and the hammers made to stand each as high as the other at both full and half-cock, the extractor well made, and closely fitted, and smoothed underneath; the rib is put on properly, its edge will appear to be level, its surface flat and regular, and the engraving of some design. In better grades there is a smoothness and flatness of the lock-plates that is at once noticeable, and if the thumb is drawn lightly round the barrel it will not detect those flats, which even the eye cannot see. The pins will be carefully fitted flush with the surface, and the slits in them regular as to size and depth, and lying all one way. Unless attention be given by the workman to every

piece, no matter how seemingly unimportant, the gun is not well-made, and may fail just where least expected.

The machine-made and machine-finished gun may be distinguished: First, by its rough "metallic" appearance; second, the heads of the screws will be found to be rounded down, not filed off flush with the lock-plates, breech-action, butt-plate, etc., the slits of the screws lying at different angles; third, inequalities in barrels and rib; fourth, the stock shaped like an army musket. In hand-finished machine-made weapons many of these irregularities will not be noticed; but as long as the gun is interchangeable, many matters in construction and finish have to be sacrificed, and, as a general rule, the further removed a machine-made gun is from interchangeability the greater is its worth.

The spurious gun may be either a gun represented as being of a quality it is not, or as a production of a maker other than the real one. After taking all into consideration, it is the first class which is the most dangerous to the unwary buyer. The vapid platitudes of the salesman spread a glamour over the transaction, and the sportsman purchases a gun which will trouble him more and more as he gets to know it. Against the purchase of this class of gun the sportsman must always be on his guard.

The second class of gun is simply a forgery. Belgian guns are sent to England to be proved, or

the English proof marks are imitated; "English fine twist" is engraved upon the rib, or *any* maker's name is put on to the order of the importer.

All the leading makers, or their retailers, now advertise, so that the exact name of the maker wished is easily obtained. See that the gun bears this name, and rightly spelled, for the change of a letter is often made, the maker of the forgery thinking that his liability is lessened; and foreign forgers make dreadful havoc with English names, whereas probably no careful maker has ever turned out a gun wrongly or incorrectly named, so far as HIS name goes.

As to the more general forgeries, they will be found to be changes rung upon the name of a maker of reputation. No one would forge "Smith" or "Jones," and happy the gun-makers who possess such names; but names as "Greener" will be spelled "Greenen," "Purdey" as "Purdy," "W. C. Scott & Son" as "J. N. Scott's Son;" whilst of the imitation of "Westley Richards" the name is legion. The alteration in the initials of the Christian name or address is more frequent, and all "Horace Greener," "Albert Greener," "J. H.," "W. H.," "A. H.," and other "H. Greener" guns are practically forgeries.

Before purchasing a second-hand gun, unless you know its history or are well acquainted with the person offering it, write to the makers of it, give its number, and ask, as a favour, to know its

original list price and the date of its original sale ; the gun-maker will never refuse this information. If the gun has been stolen or lost, and he is acquainted with that fact—as he probably will be—you will at once be advised, and in any case the information he gives will prevent you from being induced to part with more money for the gun than it actually cost when new. Many succeed in making money out of the purchase of cheap guns, which they use for a few times, and then offer as second-hand weapons of very superior quality.

Gun-makers who sell guns ranging from ten to fifty guineas not unfrequently have slightly-used guns of their cheaper qualities represented as being of their best make, and instances are on record of guns purchased at the full retail price of fifteen guineas being sold as a bargain at twenty-five pounds when second-hand. It is far better to go to a respectable maker, who has a reputation to keep up, and purchase a new gun at from ten to fifteen guineas, than lay out the same amount on a second-hand one, which may be worn-out. There are numbers of makers in Birmingham who can supply good guns at the above price.

Shop-soiled guns, with various faults, blemishes, and sometimes guns with serious defects, are sold to dealers in second-hand goods, are sent to auction sales, or, as a last resource, are pawned ; so the purchase of a second-hand gun is even more risky than buying a horse in market overt.

## OF THE MANUFACTURE OF GUNS.

The quality and cost of modern guns are chiefly dependent upon the design and workmanship of the weapon; the most expensive to manufacture being ejector guns.

The material employed in the manufacture of sporting guns is usually the best procurable, but as this material is capable of being improved by the proper manipulation of the metal in the processes which are necessary to convert it into gun-barrels, there is, and must be, a wide divergence between the prices of a good serviceable gun-barrel and one of the first quality. With respect to Belgian barrels, they are made of much softer metal than English Damascus barrels; they will not stand full choke-boring, and so soft and yielding are they that they bulge at the choke when fired, and cannot be made to retain their shooting qualities. These remarks apply to all qualities of Belgian Damascus barrels.

## OF ENGLISH GUN BARRELS.

Of English Twist barrels there are two types—the machine-made, which have a rather coarse appearance, and often present irregularities of the figure; and the hand-welded barrels, which contain a larger percentage of steel, and are now very difficult to obtain.

The best hand-made English Damascus, or laminated steel barrels are made at Birmingham

only, and are, without a doubt, unrivalled the world over for beauty, durability, and reliability.

These barrels are closely imitated by Belgian workmen, and find a ready sale in this country, especially amongst the London gun sellers.

The "figure" of the barrels may be recognised from the illustrations in this book, and when examining a barrel of this kind, if the figure is regular, small, and light in colour, they may be regarded as of good quality.

Steel of the right quality has been found to possess sufficient strength to resist the strain to which a shot-gun barrel is ordinarily subjected.

The safety of the weapon with any charge should be guaranteed by the English Government Proof House: an institution for which the gun-maker is heavily taxed. Poor as our Government proof test has been, it has ever been the strongest and most thorough of any obligatory test yet imposed in any country.

At Liège the proof is done with a quality of powder so poor, that even in the cheapest Continental-made breech-loader, both barrels may be proved together, without the probability of a reject.

At St. Etienne the proving of guns is not obligatory; the superior proof is with an explosive chosen by the gun-maker.

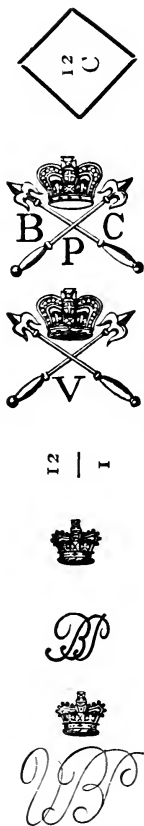
In America no proof-house exists.

Even the English proof test cannot be considered a perfect guarantee of a gun's safety,

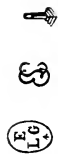




London Proof-House Marks.



Birmingham Proof-House Marks.

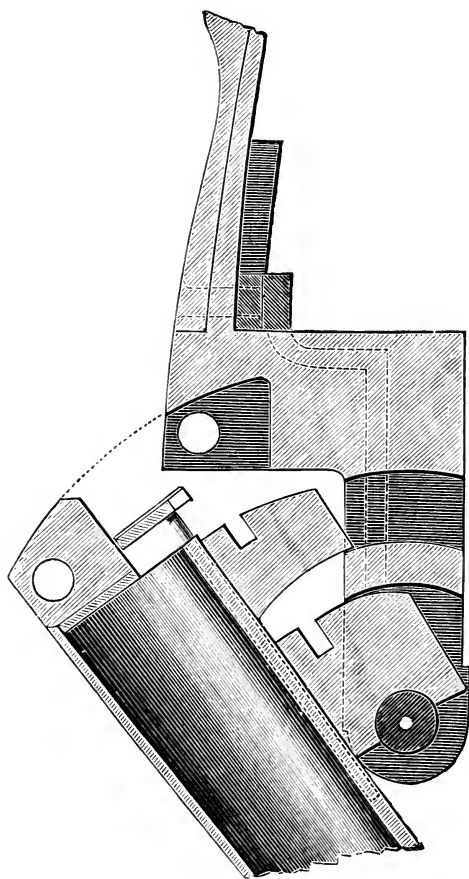


Belgian Proof Marks.

although the buyer will, of course, reject at once any weapon not possessing it. The guarantee, in this respect, must be the name the gun bears. The proof charge (definitive) for an ordinary 12-bore gun is  $6\frac{1}{2}$  drs. of powder with  $1\frac{2}{3}$  ounces of shot.

#### BREECH-ACTIONS.

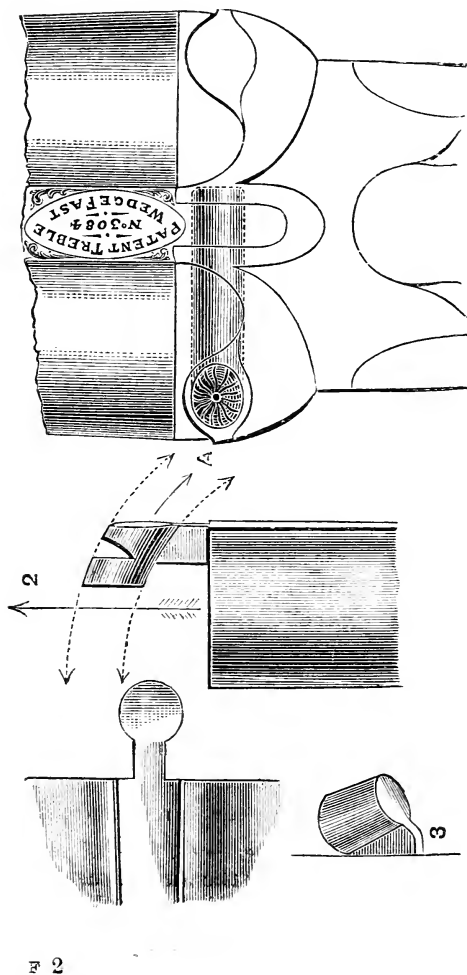
In the choice of breech mechanism a top-lever will certainly be decided upon; side and bottom levers will not be chosen, save for very special purposes, or to accommodate a sportsman habituated to this form of lever from long use. The top-lever so conveniently placed enables even the most determined adherent to any other form of lever to quickly and comfortably manipulate the breech mechanism. As to holding-down bolts and cross or grip bolts, and the number and position of the barrel lumps, the sportsman will demand two binding and well-fitted bottom lumps or lugs substantial in size, and the back lump so shaped as to correspond with the circular front of the slot in which it is embedded, and so well fitted that when the gun is closed and free this portion of the lump shall take a part of the strain. This matter of fitting the barrels is termed "circle jointing," and the accompanying illustration will convey a better idea of its nature than a verbal description. A gun so made will last longer and be stronger than a weapon with ordinary lumps; the need for more lumps at the bottom has never



The Working and Bearing Parts of a Hammerless Breech-Action.

been proved, and the mere multiplication of them for the sake of complication is an error.

It is advisable to have a sound top connection between the barrels and the breech action. Such a connection adds greatly to the strength and life of a gun, and is a protection to the sportsman in all cases. On arms of some descriptions it is practically necessary to provide an adequate top connection, although guns of the ordinary type, when very carefully built and used with moderate charges, have been known to stand even continuous wear for years without the aid of a top connection; it is, however, ridiculous to contend that they would not be better, safer, and stronger with an efficient top cross-bolt. The common top connection is a "doll's-head," fitting more or less badly into an ill-shaped hole, hollowed out in the standing breech to receive it. (*See* No. 3 in the accompanying illustration.) This useless encumbrance is affixed to guns to appease the ever-increasing demand for an efficient top connection which the success of the author's and the Westley Richards' mechanisms has produced. No. 2 of the illustration shows the Westley Richards', the best form of "doll's-head." The strain upon firing is in the direction of the arrow, but at the same time the expansion of the barrels conveys to the extension a tendency to move in the direction of the shorter arrow (A); the bolt into this top extension in some measure prevents movement in the



Top-connections between Barrels and Breech-Action Bodies.

direction of A, but much depends upon the manner in which the bolt is fitted.

The Greener Treble-Wedge-Fast Top cross-bolt makes the strongest breech action known. The bolt securely binds the breech ends of the barrels to the breech-action body, and is worked by an arm on the top lever. It is far superior in strength and lasting power to the double-grip action.

A double 4-bore and a double 8-bore were made on this, the top cross-bolt principle, in 1874, for Mr. G. P. Sanderson, Superintendent of the Government Elephant Keddahs, Decca. They have been in continual use ever since, firing 2 oz. bullets with 12 drams, and 4 oz. bullets with 16 drams of powder "hundreds of times," and to quote Mr. Sanderson, "the breech actions are as sound and close as when they left the factory nearly eighteen years ago." These rifles are *still* in use and doing excellent service.

A Greener Treble-Wedge-Fast gun may be fired hundreds of thousands of times without any repairs being required. To the author's knowledge the gun he supplied to Dr. Carver in 1878 was fired one hundred and thirty thousand times without any repairs being done or required; and the gun is still in use, and has had possibly thousands of shots fired from it since the author last saw it.

With a top cross-bolt barrels may be fired together without the least possibility of the breech

action giving way, and as this is a contingency that may at any moment accidentally arise, it is as well to be furnished with a gun that will stand both barrels being fired together.

The sportsman will choose a gun with top cross-bolt, providing that he wants a gun that will fire any charge without the breech action giving way, providing he requires a light gun—a gun for very heavy charges—a gun for hard wear—a gun that will last him and always be satisfactory.

#### HAMMER, HAMMERLESS AND EJECTOR GUNS.

A hammerless gun is to be preferred to the hammer gun, as being safer to use and easier to manipulate. The hammerless gun is stronger than the hammer gun, less liable to damage, less complex in construction, more durable, in all more important particulars the superior of the hammer gun.

The hammerless gun of inferior make is as dangerous as the inferior hammer gun, if not more so; and in the choice of a hammerless gun the sportsman will be guided by, 1st, the simplicity of the mechanism; 2nd, the efficiency of the mechanical parts introduced to effect that hitherto performed by hand; and 3rd, the reputation of the maker whose name it bears.

All guns cocking by means of mechanism geared on, or in any way connected with, or dependent upon, the motion of the top breech action

lever for effecting the cocking of the locks, will be at once rejected, because they are liable to miss fire if the lever does not snap "home," and because they are generally fitted with weak mainsprings, and often require great force to open.

Of those guns cocked by the falling of the barrels, or closing of the gun, will be rejected all that, 1st, do not permit of the barrels being placed readily upon the stock ; 2nd, that may be wrongly put together and so cause a breakage ; 3rd, that require a jerk to open or shut ; because all such guns will be an annoyance to the owner, and in the case of the last objection will cause undue wear at the hinge joint and need early repairs.

There are several guns which will fulfil every requirement of the sportsman so far as mechanism goes. The hammer gun, notwithstanding the use of the rebounding locks, which saved the many accidents that resulted from the half cocking of the locks, cannot be so safe as hammerless, as hammer guns have been known to go off unexpectedly owing to a twig wedging in between the hammer at half-cock and the striker, and many more owing to wear or faulty construction have exploded when at the rebound by means of an accidental blow upon the hammer. The most common cause of accidental discharge in the hammer gun is when placing the gun at full-cock from half-cock, or the reverse, the hammer is likely to slip from the thumb and explode the cartridge.



With some hammerless guns, nothing short of pulling the trigger can fire the gun.

However expert he may become in manipulating the locks and loading the gun, a sportsman armed with a weapon of the ordinary type is heavily handicapped by the sportsman provided with an arm in which, without any trouble or extra exertion on his part, such processes as cocking the locks and taking out the fired cases are performed for him more quickly and more surely than they could be were he the most expert manipulator.

The self-cocking of the locks is in itself an immense advantage, and the self-ejecting of the fired cases, by reducing the number of movements to be made by the hands when loading, is decidedly worthy of support. The ejecting mechanism as made by the author has been tested in every quarter of the globe and under all possible conditions, it has been found thoroughly reliable in every climate, and is consequently recommended by all who have made use of it; at the present time it stands at the head of sporting guns, the nearest to perfection.

For speed the self-ejecting gun is ahead of all magazine or repeating shot-guns, and not only can it be fired more quickly, but it is free from any liability to "jam" when rapidly manipulated, whilst the repeating mechanism of shot-guns is more prone to "jam" than the mechanism of a

rifle, owing to the use of paper cartridge cases, turned down to various lengths.

#### THE PRICES OF GUNS.

Much nonsense is written, chiefly by sportsmen who think they know all about trade matters, concerning the price of guns and the cost of producing them. In one book, which is intended as a work of reference for sportsmen, a detailed list is given of the cost of producing a gun, and to every item in that statement exception could be taken, and whatever its utility it may safely be asserted, that if the full value of every item there given be used in making one gun the result would astonish no one so much as the man answerable for that bill of costs.

A double-barrel, central-fire, 12-gauge breech-loader can be purchased wholesale for about thirty shillings. A best gun with hammers, a really sound, useful sportsman's weapon, is sold at sixty guineas by some makers, and will not be sold for less. The difference, it need not be said, is not for the name of the maker engraved upon it. The best gun, even when made in the centre of the gun-making industry, costs very much more to produce than sportsmen or critics suppose. The barrel is made of a splendid quality of metal, costing a fabulous sum per ton. In constructing a pair of tubes 18 lbs. will be used, and the metal will be worked at a red heat, and from its multitudinous welds, as well as from its inherent quality, will gain strength, *i.e.*,

tenacity. This 18 lbs. of iron, by hand labour, has to be reduced to 3, and the superfluous metal must be removed just as and when required, or the barrel will be worthless. Through twenty-six succeeding processes these tubes have to be handled, worked, and treated with care, and may, after receiving every attention human skill can devise, prove defective at the last moment, and instead of figuring in the best gun be relegated to the waste heap.

It is in the attempt to make something of really superior quality that material is spoiled and workmanship wasted. To produce a best gun, not only must a staff of skilled workmen be obtained, and every man must not only be able, but inclined to do his best, both with respect to his own work upon the weapon, and with due regard to the work of those who have taken, or are about to take, a part in the production of that gun.

The best gun must be tried in various stages, and must pass in each before proceeding to a succeeding stage; hence time as well as money is needful to its production. The well-finished gun is one in which the design is good and carefully executed, every portion being exactly shaped, rightly placed, and perfectly adjusted, with that accuracy of detail which skill and practice alone can give. Finish consists of the due relation of each part to the whole, and is a thing apart from the ornamentation or embellishment of the weapon.

A gun made and finished in the best manner will stand more hard wear than an ordinary gun, even if the principle upon which the commoner gun is constructed be superior to that of the best gun. Common guns always give way first in small details : a pin works loose or breaks, and as soon as it is replaced, and the gun is made good in one place, it gives way in another, whereas a best gun is practically indestructible, and, barring accident, will last a lifetime. If, therefore, you purchase a gun in order to enjoy sport, have a best gun ; if you must shoot, and do not mind when, take an ordinary gun ; it may fail you when you have a first-rate chance to bag game, but the best gun is always good alike, and thirty seasons' hard wear will leave it as good as new for all practical purposes.

Between the cheapest gun and the most expensive there are weapons which serve the needs of a very large number of sportsmen. Those guns which are sold at the lowest prices, and are actually the best value for money, are the weapons of a good type which are out of fashion. Guns with double-grip action, with side-lever action, with under-lever snap action, with non-rebounding locks, with hammers of large size and standing high, have much depreciated in market value ; from £5 to £10 is sufficient to give for such a gun, unless it is by a maker of very high standing, when, even as a second-hand gun, it may realise £25. Good

serviceable hammer guns with a sound top connection, fine barrels, and of honest workmanship throughout, may be purchased new from about 12 to 13 guineas. And hammerless guns, upon a principle which every practical sportsman and expert will endorse as being good, may be purchased at about 15 or 16 guineas. There are writers and advocates who will contend that this price is too low for a reliable hammerless weapon, but such writers judge from prices asked in the most expensive shops, and are not acquainted with prices current at the centre of production. It is generally admitted that guns are made in Birmingham of quality equal to those produced in any other town in the world, also that they can be produced more cheaply there than in any other town in Great Britain. *Verbum sap.*

The high prices obtained for Birmingham guns the last few years go to show how highly they are esteemed by sportsmen. Twenty years ago 35 guineas was considered a very high price for a Birmingham gun, now the modern breech-loader of two or three makers sells at 45 guineas, complete, whilst the author's Royal Gun realises 60 guineas without a case.

The author trusts that he has made clear to his readers the necessity for close investigation of workmanship before purchasing. In general appearance a cheap untrustworthy gun may closely resemble one of good quality. It is the practice of some manufacturers to make the outward appearance of

their weapons exhibit some fine, if not careful, workmanship, and a few shillings spent upon polishing, hardening, chequering, engraving, etc., will make a badly-fitted gun look the same as a fine gun to the eye of the average buyer—even to be preferred to one of much superior quality, in which the money has been expended in the fitting of action work, lock mechanism, barrel boring, etc., etc., all of which are essential to the gun, and really determine its worth.

Very fine workmanship, elaborate finish, and the best of material, is a combination always costly. Good material, sound workmanship, and careful finish are more easily obtainable, and these points should be required in the cheapest weapon. Inferior workmanship, indifferent material, and “elaborate” finish cost less, and are more often found, as makers hope, by imitating the well-designed and executed patterns of the best makers, to convince purchasers that the copies are of equal quality. For instance, the polish and gloss *outside* a pair of barrels is of small importance, yet a few shillings saved in the boring and shooting, and half of the money so saved expended on the polish and bronzing of the barrels will “fetch” more buyers than a gun in which all the money has been spent upon essential points.

An expert will tell whether a gun action is well fitted or not—whether the locks are well filed, or badly made. The average sportsman cannot, hence

gun-makers tempt buyers by appealing to the eye, instead of expending money where the result cannot be seen, but is found by experience. Some London makers and others have followed the author's plan of producing guns quite plain, almost musket-like in their outward appearance, and the money usually expended upon polishing, engraving, chequering, and otherwise embellishing the weapon, spent where it is absolutely required. The result is a sound, serviceable gun, at a low price, and bearing a name which is sufficient guarantee of its reliable quality. If the gun cost quite as much, and various prices were cut down, and others increased, so that a prettier gun might result, the manufacturer of good reputation would not care for it to bear his name. A cheap gun of flashy appearance should be avoided. A pair of good straight barrels, well-fitted breech-action, and reliable locks, may not show to advantage by the side of a pretty stock, glistening barrels, and artistic engraving, but in the field are worth very much more.

#### ANSWERS TO COMMON QUESTIONS.

1. A gun chambered for the standard length case ( $2\frac{9}{16}$  inches) may be used with longer cases *if* they will go in the chamber, but increased recoil and greater strain upon the breech-action and barrels will result; with light guns, and more especially when using nitro-powders, the practice is dangerous.

2. Guns chambered for the  $2\frac{3}{4}$ -inch and 3-inch

cases *may* be used with shorter cases. The penetration will be equal, but the pattern slightly inferior.

3. Small charges in long cases: It is recommended to fill up the space with wads (between the powder and shot) in order to bring the charge to within a quarter of an inch of the end of case, just leaving enough to obtain a nice "turnover" or "crimp." Too much "turnover" does not give such good results.

4. Thick wads should *not* be used over the shot, unless it is desired to scatter the charge.

5. The strain produced upon a gun is considerably greater when using smaller sized shot than No. 5. With No. 4 the charge of shot may be increased with advantage. A further increase may be made with No. 1 shot, or the charge of powder reduced. By this system of loading the range of a choke-bore is extended.

6. Shortening barrels: Choke-bore barrels cannot be shortened without spoiling the shooting of the gun; when shortened, they may be rebored to shoot equal to an improved cylinder only.

7. When cutting down the barrels to reduce the weight, a 12-bore loses about four ounces for every two inches, as the stock is hollowed as well, in order to retain the balance.

8. Twenty-seven-inch barrels are the shortest from which *good* shooting is to be obtained. Twenty-four inches is the shortest length recommended for



the barrels of a shot-gun, and are suitable only for covert shooting, or special purposes.

9. Before any alteration is made to the boring or chambering of a gun it is advisable to seek the opinion of the maker. The ordinary  $2\frac{9}{16}$  case is capable of containing a charge sufficiently heavy for pigeon shooting, and the deepening of a chamber to  $2\frac{3}{4}$  or 3 inches is without advantage, and would, in most instances, weaken the barrels to a dangerous extent.

10. When a gun is required with two pairs of barrels, of the same calibre, for one stock, one pair full-choke, and one cylinder, the latter cannot be made more than 4 oz. lighter than the choke pair.

11. Gun-makers are sometimes instructed to make guns having a pair of 10-bore and a pair of 12-bore barrels for the same action. This plan cannot be recommended, as the weight and balance of the gun has to be sacrificed to one pair or the other, if not to both. The action must be large enough for the 10-bore, therefore the 12-bore barrels must be very thick at the breech ends.

It is better to have two guns than such a weapon as indicated. The weight of the gun with 12-bore barrels cannot be made much lighter than with the 10-bore barrels, as sometimes supposed. A pound difference is quite impossible if the weapon is to be satisfactory with either pair of barrels.

12. The cost of fitting new barrels to old guns is usually about half the original price of the gun, for

fine guns, but no barrels can be fitted properly for less than ten guineas, as much hand-work is required, and that of the best skilled gun-smiths.

13. For answers regarding the "Conversion of Guns," *see* page 130.

14. It has already been stated that the quality and cost of modern guns is chiefly dependent upon the design and workmanship of the weapon.

The difference between a gun costing 60 guineas and one at £12 is not in engraving and ornamentation alone (a very small item in the cost of production), but in the quality of materials and workmanship throughout every stage of its manufacture, as explained in the preceding chapters.

15. The usual shape of the rib of a sporting gun is that of the barrels ; its top should follow a line parallel to the top of the barrels. This is termed a swamped rib. Sometimes it is made level from end to end, when it is termed "straight." A "flat" rib is flat from side to side, whilst a "hollow" rib has both its upper edges raised, so that in shooting the eye looks down a groove. Thus it is possible to have a "hollow" level or "straight" rib, and a "flat" swamped one. Sportsmen often use these terms as though they were synonymous, whereas they indicate different forms of the rib.

## CHAPTER III.

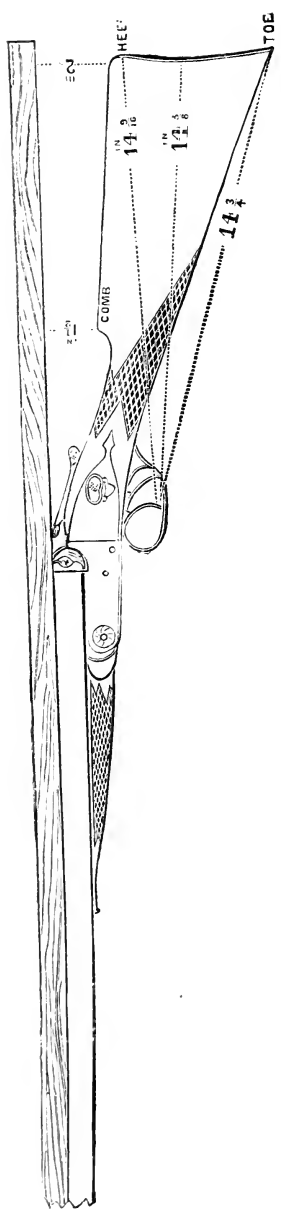
## OF THE SHAPE AND DIMENSIONS OF GUN-STOCKS.

THERE is no definite authority for the prevailing fashion in gun-stocks, and the dimensions and shape of this part of the gun have given rise to more frequent discussion amongst gun-makers and sportsmen than anything else connected with shooting.

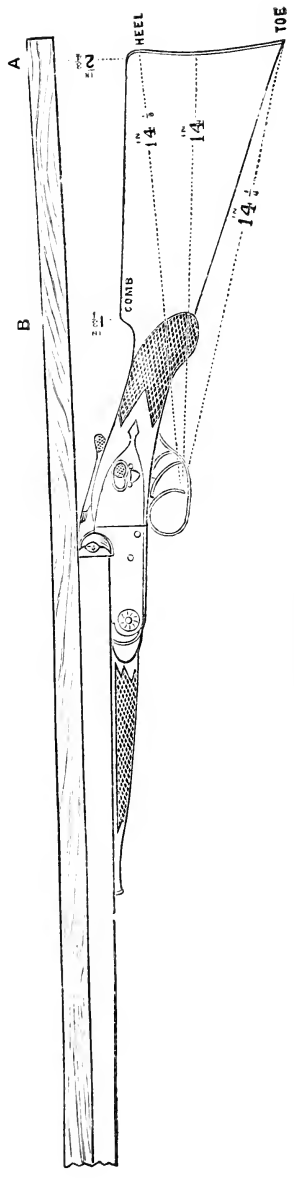
The measures of the gun-stock include the bend, length, and cast-off. These are of great importance to the user of the gun, and must suit his particular method of handling the gun, as well as the stock being of such dimensions as the shooter's build, *i.e.*, length of arm, breadth of chest, etc., may determine.

The measures of the gun-stock may be ascertained as follows:—

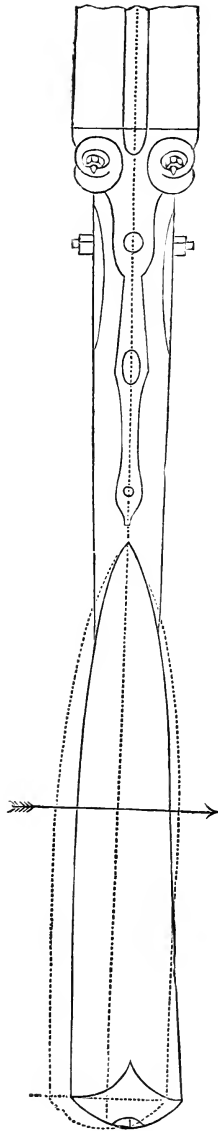
Take a piece of wood or iron, with a perfectly straight edge, sufficiently long to reach from the sight on the muzzle to the extremity of the butt; lay this straight-edge along the rib, and measure the distance from A to HEEL, and from B to COMB. This is the BEND. The LENGTHS required will be from the centre of the fore or right-hand trigger to



The English Gun-Stock.

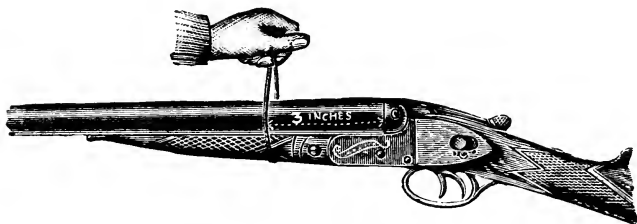


The "American" Gun-Stock.



Gun-Stock showing 'Cast-off.'

the HEEL, CENTRE, and TOE respectively, and the depth from the heel to the toe. The circumference of the hand may be obtained by passing a string round it *immediately* behind the trigger-guard, measuring the string. In taking the length, measure



Showing how to Balance a Gun.

the extreme length, and not to the edge of the heel-plate. The dimensions given on p. 82 are in due proportion, and as usually made for English and American sportsmen respectively.

CAST-OFF is the amount the stock is thrown out of truth with the barrels in a *lateral* direction. Most gun-stocks are twisted over—that is, the toe of the butt is more “cast-off” than the heel—the usual “cast-off” is  $\frac{3}{16}$ ths for heel, and  $\frac{3}{8}$ ths for toe. The object of “cast off” is to admit of a proper aim being easily taken, and the amount will vary according to the build and physique of the person for whom the gun is constructed.

*Balance.*—This is always to be measured from

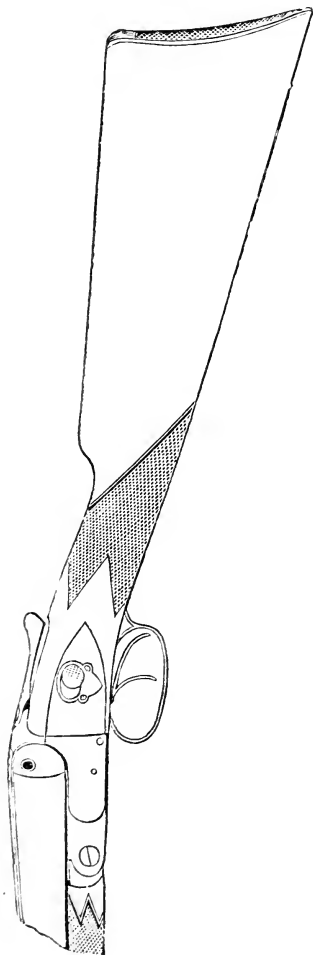
the breech-ends of the barrels. It is best to balance the gun on thin string.

A 12-bore with 30-in. barrels weighing 7 lbs. or over should balance at about 3 ins. from the breech; if with 27-in. or 28-in. barrels and  $5\frac{3}{4}$  lbs. to 6 lbs., about  $2\frac{5}{8}$  ins. from the breech would be considered a good balance.

The measures given in the illustration of the English gun-stock are the dimensions usually adhered to by gun-makers in this country, and guns so built are found to suit quite 80 per cent. of British sportsmen.

Americans use guns with stocks much more crooked, as, when shooting, they keep the head erect, and many English colonists follow this rule, the crooked gun-stock being quite common in South Africa.

The lengths of the gun-stock from fore-trigger to toe and heel will regulate the angle of the butt, and the *cast-off* will throw the butt over a little, so that unless the butt were rounded or champfered, its *edge* only would touch against the shoulder. The amount of champfer required will depend upon the amount of "cast-off," and the build of the person for whom the gun is intended. Dr. W. F. Carver always shoots with a heel-plate, not only much hollowed—*i.e.*, *very much* shorter to centre than to the extremities—but also champfered so as to fit squarely against the muscles of his shoulder. Many shooters will find it more comfortable to



Gun-Stock w th Chamfered Butt.



shoot with a gun having the butt so rounded, or sloped, than with the usual butt, which is of equal length to either edge.

Guns with stocks from 14 in. to  $14\frac{3}{8}$  in. long, measured from the fore-trigger to the centre of heel-plate, will be found in most gun-makers' stock, and the common "cast-off" is  $\frac{3}{16}$  in. at heel, and  $\frac{3}{8}$  in. at toe. A sportsman, above the average height, should take a gun-stock longer than usual, and also one slightly more bent. The longest stock the author has made is  $15\frac{3}{4}$  in., and the greatest bend  $4\frac{1}{4}$  in. It rarely happens that stocks shorter than  $13\frac{3}{4}$  in. are required. A shooter with sloping shoulders will find that a stock about  $2\frac{3}{4}$  in. bend at heel and  $1\frac{3}{8}$  in. at comb, will probably suit him best.

The gun-stock must be so fashioned that the butt shall be at a right angle, or nearly so, to the barrels, and the gun will stand with the barrels *almost* perpendicular. Some, however, prefer that the gun when stood upright shall be such that the sight and the centre of the butt shall be in a plumb-line.

The "cast-off," as already explained, is the *lateral* deviation of the stock from the common axis of the barrels. This permits of the barrels being more readily aligned.

A thin man requiring but little cast-off to his gun, whilst a stout man with broad shoulders may need a gun much cast off.



Shooting a Straight Stock Gun.

EXPLANATION.—At the time of firing the whole of the butt-plate should be in contact with the shoulder of the shooter. When firing at ground game this is almost impossible with a straight gun stock having the usual amount of toe. Usually the gun stock projects much above the shooter's shoulder—as shown—the result being that the recoil causes the gun to jump up. If the gun be fired whilst held as shown above, the cheek of the shooter would have to sustain a goodly share of the force of the recoil.



Shooting with a Rational Stock.

EXPLANATION.—The rational stock is, at the time of firing, squarely bedded against the shoulder of the shooter, and whether firing at ground game or at birds flying straight over, must always have a greater portion of its butt-plate in contact with the shoulder of the shooter than it is possible to get when using the ordinary straight stock.

The pistol-hand gun-stock, especially in that form shown in the illustration of the American gun-stock, and known technically as half pistol-hand, is the common form throughout Canada and the United States, and is also being adopted by the sportsmen of Australia and South Africa.

Amongst English sportsmen the use of the pistol grip is confined chiefly to double rifles and large-bore guns, and it permits of a firmer grip than the straight hand stock, but is not so convenient for pulling the left trigger in quick succession to the right. With the straight grip the hand may slide backwards, but with the pistol grip it is necessary to bend the trigger finger more to fire the second barrel rapidly. Some sportsmen, whether using straight or pistol-hand stocks, find it more convenient to pull the near trigger first and move the hand forward to fire a rapid second.

#### GREENER'S UNBREAKABLE STOCK.

The necessity for such additional strength to the usual gun-stock is fully proven by the numerous orders received for extra butts to be supplied with new guns and rifles intended for use in India, Africa, and other wild countries.

The author has designed and patented a gun-stock which is practically unbreakable. The stock is fastened to the breech-action by a long butt-pin passing through the centre of the hand, and screwing into the back of the breech-action (similar to

the Martini), and thereby firmly securing the butt to the action, and, at the same time, strengthening the weakest part of the stock.

The diameter of the butt-pin is reduced at intervals to allow for the expansion of the wood, and prevent the stock splitting.

We have had a gun fitted with this improvement in use for the last two seasons, purposely



submitting it to very rough treatment, in order to thoroughly test it, such as striking it against wooden rails and other obstacles, dropping it from a dog-cart, letting it fall from horseback, and throwing it several times from a tree (20 ft. in height) on to the ground, and many other similar tests, all of which it withstood perfectly. One cannot conceive a use to which a gun could be put that this stock would not withstand.

Another advantage claimed for this improvement is "the perfect rigidity of the stock." The steel pin passing through the hand prevents the

“springing” of the stock, which has been proved to exist in some guns, causing them to shoot low.

Extract from *The Field*, July 30th, 1892:—

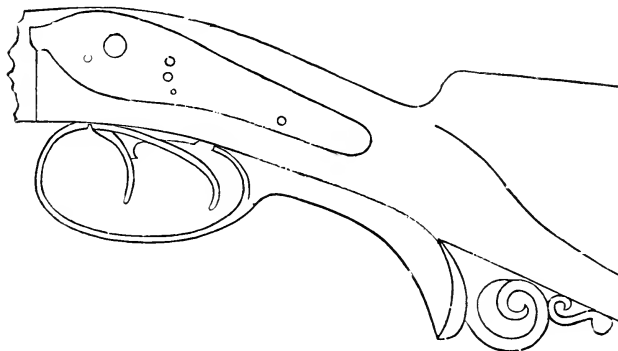
“A few months ago we were shooting a light game gun at the target, and were surprised to find that the centre of the charge of shot struck the target about 12 inches low. After a few trials it was found that the phenomenon was due to the recoil springing the hand of the stock, so that while the charge was passing through the barrel the stock became more bent, and therefore caused the gun to deliver its charge below the point aimed at. After pieces of wood had been glued to the ‘hand’ of the stock, so as to prevent it springing, the charge was thrown perfectly true and central.”

The unbreakable stock is specially suitable for Express and large-bore rifles, duck guns, and guns for rough wear, and for use abroad.

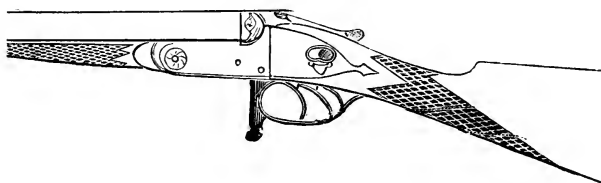
There are other shapes of gun-stocks, with some of which sportsmen may be acquainted, but to others they will be novel and offer certain advantages.

First, there is the *horn guard*, equivalent to the *scroll guard* of the old-fashioned English rifle. This guard is supposed to allow a better and firmer grip of the gun to be obtained with the right hand—the same advantage as claimed for the *pistol-hand* stock, which, moreover, prevents the second finger of

the right hand from being bruised by the back of the trigger-guard.



The horn guard is much used by some Continental sportsmen, and the German gun-makers particularly fashion it into an ornamental fitting for either the shot gun or rifle.



The Horn before Guard Gun-Stock.

Another Continental form is the shield guard,

or horn before guard. With this style of stock the gun is grasped just in front of the trigger-guard by the thumb and forefinger of the left hand, the palm of the left hand and the remaining fingers being firmly pressed against the guard. This style of holding the gun is not to be commended, but it must be admitted that many fine shots are to be found who never hold their gun differently.

The rational gun-stock was introduced by the author some time ago, and it embodies qualities long sought in pistol-grip guns, and the undeniable advantage of the straight stock.

In this stock, as will be seen from the illustration, there is more than the usual bend at the *bump* or *heel*, and that the comb is not straight, but *arched* slightly ; and as the cheek touches the stock about midway between the *heel* and the *thumb*, it is there, and there only, that the stock need be straight.

With the usual English gun-stock, put up in the usual manner, it will be found that about *one-third* of the upper part of the *butt* projects above, and has *no* bearing against the shoulder. This leaves the sharp narrow toe to steady the gun and to take the recoil.

With the rational stock the face of the shooter will be resting upon the stock when the *bump* or *heel* has reached a level of the shoulder, and the whole of the *butt* will find a bearing in the hollow of the shooter's shoulder.

The bend of the gun will, with the "rational"





The Rational Gun-Stock.

stock, be about  $2\frac{1}{2}$  ins. at *heel*,  $1\frac{1}{2}$  at *comb*, and  $1\frac{5}{8}$  midway between heel and comb.

In the rational stock the wood is left *thicker* at the toe, and thinner than usual at the heel. This enables the shooter more easily to get his gun into proper position; with the large heel and thick butt the stock often catches against the shoulder, and *jumps* afterwards to the position from which it is fired. It is believed that by reversing the taper of the butt the gun will *invariably* be brought with greater certainty and speed to its proper bearing at the shoulder.

The rational gun-stock also, instead of being straight from trigger bow to toe, is arched slightly near the end of the grip. This *shaping* of the stock is a very modified form of pistol grip, and allows not only of a firmer and easier grip being taken, but also permits the elbow to fall lower and to a more natural position when the gun is at the shoulder and about to be fired.

Of gun-stocks built for special purposes the most common is that for use from the right shoulder, but to be aimed with the left eye. This form of gun-stock shows in an exaggerated form the utility of cast-off. The stock is bent over not until the rib is convenient for the right eye, but until it is in a position to be readily aligned by the left eye, when the gun is brought up to the right shoulder.

The author when treating of the handling of the

gun and the art of wing shooting will point out exactly of what value a correctly-fitting stock is to the shooter.

Many sportsmen and some gun-makers are inclined to overrate the importance of the fit of the gun, even going so far as to say that one's shooting may be greatly improved by having an exactly-fitting gun-stock. In this connection the experience of many sportsmen will bear out that of "F.," who wrote to the *Field* of April 9th, 1892, as follows:—

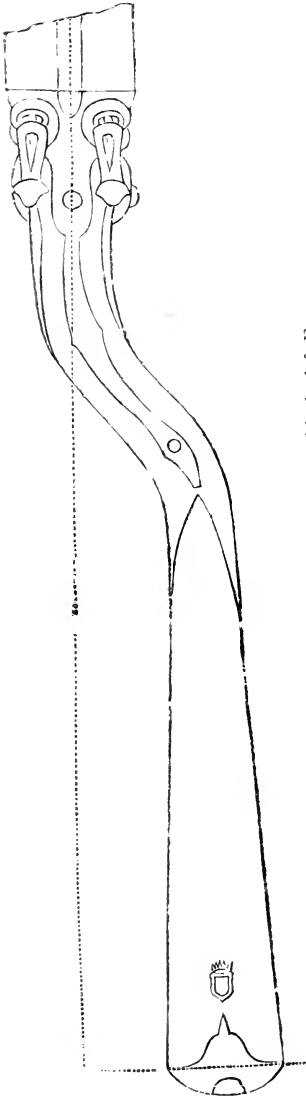
Extract from *The Field*, April 9th, 1892.

"SHOOTING UNAMENDED.

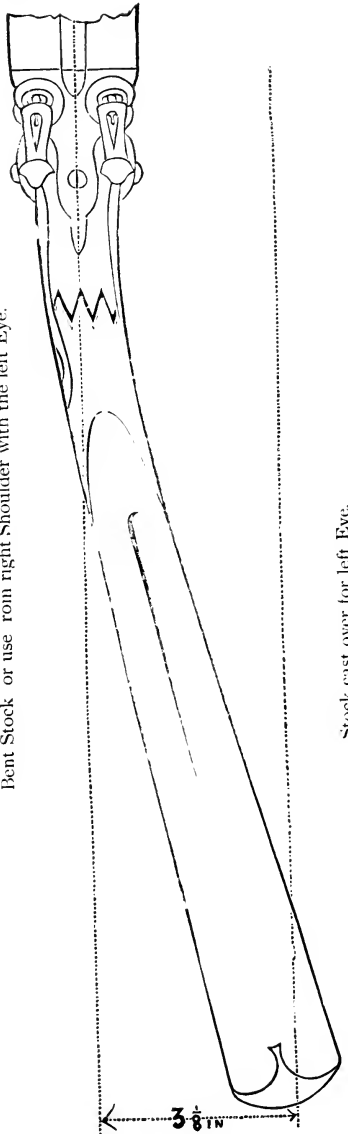
"Sir,—I am but an average shot. After reading much correspondence concerning the utility of try guns, and their power of improving a man's shooting twenty per cent., I went to a well-known gun-maker to see what I could do.

"After a certain amount of shooting which seemed to point to the fact that I shot high to the left, the try gun was altered, and with it properly adjusted I certainly seemed most successful. I accordingly ordered a gun to pattern, the gun-maker saying I ought to be a good shot, as I shot so regularly in the same place, and it was only that my gun did not suit me.

"I have now been shooting a great deal, but I find to my astonishment that it makes not the



Bent Stock or use from right Shoulder with the left Eye.



Stock cast over for left Eye.

slightest difference which gun I have in my hands. One (the new one) has a fair bend and much cast-off; the other (my old gun) is very straight with no cast-off.

“The only thing noticeable is that after a change of guns the gun seems to come up awkwardly the first shot or two. But now if I change my gun, before beginning to shoot, I put the gun to my shoulder a few times, I find that my left hand goes a bit farther forward on the bent gun, and that I am inclined to move my head a little to the right with the gun without cast-off, which I take it is the natural consequence of the difference of make.

“But if I take the precaution to put the gun to my shoulder a half-dozen times or so before shooting, what gun I have in my hand signifies nothing.

“I offer these remarks on the utility of fitting a gun, in case any of your correspondents might wish to comment on the fact of my experience. I should much like to find a gun which would really improve my shooting.

“At present I am far from gun-makers. I am afraid I feel convinced that a good eye alone can make a good shot, and provided the gun is of good make and pattern, fitting is of little or no importance.

“Central India.

“F.”

## OF THE FIT OF GUNS.

The fit of a gun is a truly personal matter, for although the majority of sportsmen can shoot well with the gun which suits eighty men out of every hundred, unless the gun is liked by them they will never feel that they shoot so well with it as they should, as no two persons are alike; therefore every person to be exactly suited with a gun will require something different to that which will suit another, but in practice the difference is often so slight as not to be noticeable. The most important point is the weight of the weapon, for many sportsmen sadly overweight themselves with needlessly heavy weapons; the gun when put up at a mark for trial does not seem heavy, but after carrying it for a few hours or when fatigued by walking, waiting, or working, the gun will not be "put up" as it was when the sportsman was fresh. The lighter the gun the greater control the muscles have over the gun to align it properly, and the longer they retain that power. The ability to handle a gun with precision is more likely to fill the game-bag than the possession of a perfectly fitting weapon. The really good shot can shoot well with almost any gun; a perfectly fitting stock will never make a good shot out of a bad one. There is no reason, however, why the sportsman should use a gun that does not suit him, nor need it be advanced that because Mr. E. D. Fulford,

who grassed 194 pigeons consecutively, Dr. Carver, Captain Brewer, Mr. J. Elliott, and other world-renowned shots, were never "measured" for a gun, other sportsmen may not avail themselves of the best methods for getting a gun that will suit them.

Most men align a gun with the right eye, that eye usually being the stronger. If the sight of the left eye is stronger than that of the right, the shooter must close his left eye when aiming, shoot from the left shoulder, or have a gun so made that it is alignable with the left eye. To ascertain which eye is the stronger, take a finger ring and hold it out at arm's length, look through it with both eyes open at some object twenty or more feet distant ; close the left eye ; if the right eye still sees the object through the ring, which has not been moved, the right eye is the stronger, and may be trusted to align the gun, and the sportsman may with advantage dispense with shooting correctors, two-eyed sights, *et id genus omne*, and keep both eyes open in shooting.

#### TO CHOOSE A GUN THAT WILL FIT CORRECTLY.

Take a gun and put it up to the shoulder two or three times without aiming at anything in particular ; if it seems to come up easily and be under perfect control, look at a mark ten or twenty feet distant and slightly higher than the shooter's shoulder, fling up the gun quickly whilst looking steadily at the mark, and immediately the gun is

at the shoulder, close the left eye, and glance at once along the rib, the sight on the muzzle should cover the object at which the shooter was looking as he brought up the gun. If, upon this manœuvre being repeated several times, it is found that the gun each time covers the mark at which it is aimed, it should be tried in like manner at other marks, at different distances and elevations ; if these marks are covered in the same manner, the gun may be considered a fit, and a little practice will make the shooter quite at home with the weapon ; it should then be tried at a target, take a few snap shots at a bull's eye, and if the shots are not placed central, something is wrong with either the gun or the shooter. If a man cannot hit a fixed mark at thirty to forty yards every time with a shot gun, he cannot expect to hit bir's on the wing.

The sportsman who can make his choice out of a large stock of guns or with the assistance of an experienced man to guide him, has a great advantage over the man whose trials must be made with a few weapons and without the help of an expert to correct any faulty actions which may escape the observation of the shooter. For instance, a person adept in the art of gun fitting would detect at once whether a second aim was taken in aligning the gun, and could immediately so alter a dummy try gun as to come up in the way desired ; whereas the shooter, if alone, must note where the gun points, and calculate what amount of alteration



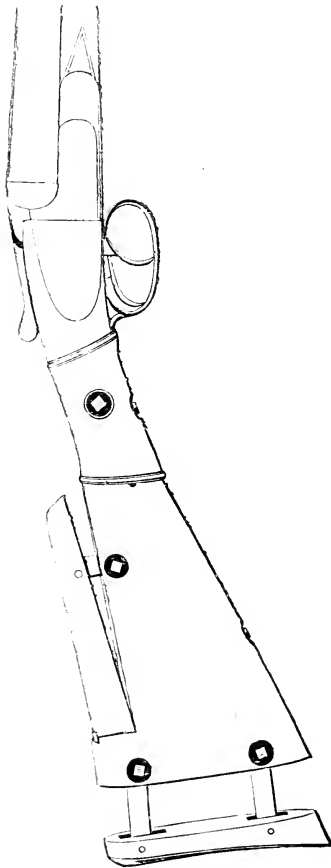
is necessary. If a gun is pointed much below the mark at which it is aimed, the stock of the gun is too crooked, too short, or the gun too heavy.

If it points above the mark at which it is aimed, it is too straight or has too much toe upon the stock. It is much better to use a gun that is too straight than one that is the reverse, as we shall try to prove in our chapter on the use of guns.

If it points to the right, it is cast-off too much; if to the left, the cast-off is not sufficient. If it is not horizontal, but twisted over so that the right barrel is the higher, the stock requires to be twisted over by casting off the toe more; if the left barrel is higher, which is very rarely the case, both the cast-off of the gun and the shape of the butt must be altered.

The straighter and longer the stock which can be manipulated with ease, the better and quicker will be the shooting, and less fatiguing the work of a heavy day's shooting. All good guns are so regulated that, aimed point-blank and dead-level along the rib, they will centre on the mark at forty yards' distance.

Some trap shots require their guns to carry as many as 6 in. high at forty yards; this is preferable to using a gun which shoots high because, being too straight in the stock, it is aimed too high. Misses with a shot-gun, as with a rifle, more frequently arise from errors in elevation than the misdirection of the aim.

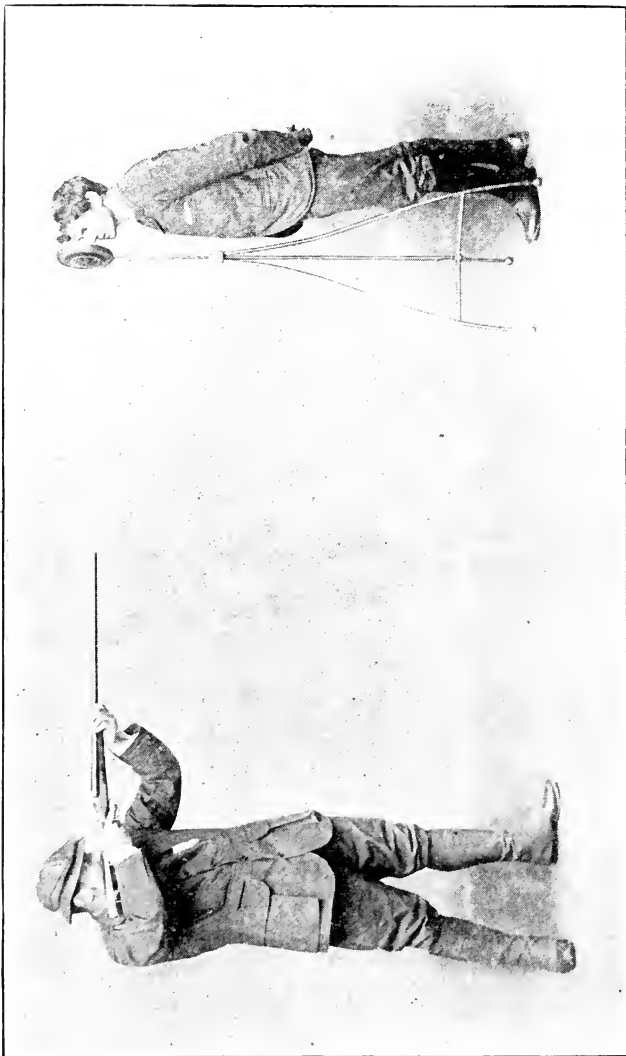


The Adjustable Try Gun.

The hand or the grip of the gun must not be so thick that it cannot be grasped with ease ; it may be of oval section, or egg shape, with the smallest point at top, or, to afford a better grasp, even diamond shape in section : it must not be round, or have too fine or too flat a chequering, or feel clumsy, and the fore-end must be narrow, standing high from the barrels, and fall full into the palm of the left hand, gripping the barrels.

A short gun-stock assists the shooter to get up the gun freely, but is against his holding it firmly against the shoulder ; a large butt, not too flat, and with a fairly broad toe, is the best for bedding firmly against the shoulder ; it should, in most cases, be slightly shorter to the left edge of the butt-plate than to the right. The better and more truly the butt fits the shoulder the more comfortable will be the gun in use, and the less appreciable will be the recoil.

The "try gun" is a gun-maker's tool, which permits of the stock being altered to any length, bend, cast-off, and shape of the butt, and is of use in fitting a sportsman who needs a gun of special build. Most of these guns are capable of being fired, but, as not one of them handles at all like an ordinary gun, it does not follow that, because a shooter is able to use it with success, a proper gun made with the same measurements of stock will prove quite suitable. It is a gun-maker's tool only, and can be used to good advantage



Oliver's Sight-Aligner and Adjustable Gun.

only when in the hands of an experienced gun-fitter.

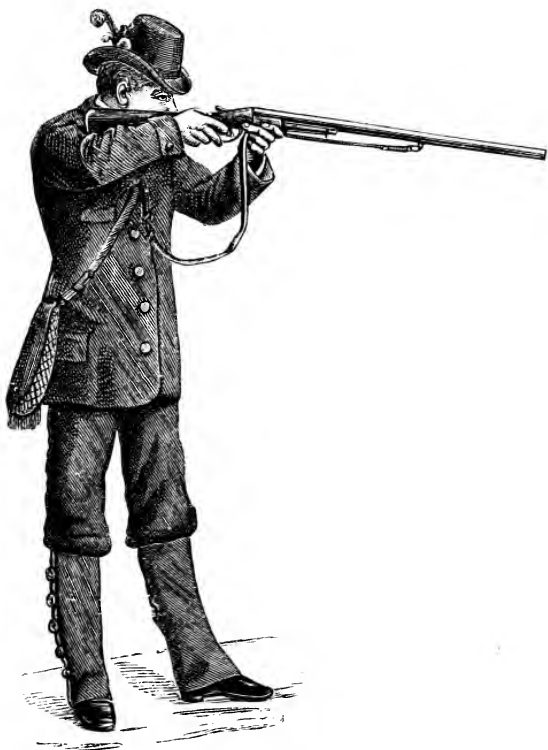
#### OLIVER'S SIGHT-ALIGNER AND ADJUSTABLE GUN.

The sight-aligner and adjustable gun, invented in 1882 by Mr. E. Oliver (Mr. W. W. Greener's London House manager), is so contrived that an expert stands behind the sight disc, and while the aim is being taken he can discover whether both eyes of the shooter are open, and if the aim is a correct one. It is possible for him to see right down the barrels, providing there is a good light. This was used with the first try gun made, and was adopted by many gun-makers to get their customers properly fitted with guns.

It is sometimes said that a sportsman cannot shoot with a gun that suits him if he varies his clothing; possibly some men cannot, but they are not good shots, nor should they pose as such, for, as before stated, the good shot, the man who knows how to handle a gun and how to aim, will shoot well with any gun. Dr. Carver has in a single exhibition shoot of less than an hour's duration shot and performed equally well with a Winchester repeating rifle of the military model, a double shot-gun of  $2\frac{3}{4}$ -in. bend, and a double shot-gun of 2-in. bend. The man who really means to shoot well does so irrespective of any trifling wrong dimension in the weapon he has to use, and the acquisition of the



Captain Brewer's position at the Trap.



Continental Style of Shooting.

art of shooting enables one to do what the hypercritical Piccadilly sportsman would not attempt under the most favourable conditions.

#### SHOOTING POSITIONS.

Of the many shapes of gun-stocks, the sportsman will have to determine which is the one best adapted to his style of shooting.

A manufacturer has a collection of photographs of the members of a first-rate gun-club, taken as they face the trap and have given the word "*pull.*" Of these crack shots there are not two who hold the gun exactly alike ; each shooter, in some measure, adapts himself to the gun which he prefers.

In the illustration of the Continental style of shooting, it will be noticed the gun is nearly at right angles with the chest of the shooter, and the left hand grasps the gun immediately in front of the trigger-guard. A man holding the gun in this fashion could do with a stock  $1\frac{1}{2}$  in. longer than when shooting in Captain Brewer's style, which is just the other extreme, the left hand is as far forward as it is possible to get it. Much importance is to be attached to where the gun is grasped by the left hand.

The opposite style of shooting is to hold the gun across the chest, as in the illustration showing the use of the "Rational Stock."

Some men who attend second-rate pigeon shoots and do not take their own guns, but rely upon



borrowing one when they arrive at the grounds, are able, by putting up the gun a time or two, to adapt themselves to the measurements of the gun. Should it be too long in the stock, they hold it well back with the left hand; if too short, they slide the hand forward until they find it comes up comfortably. When too crooked, by placing the hand farther forward it makes the stock appear straighter.

When ordering a gun, to do so personally is, of course, the best, but should it be impossible to do so, a photograph would be a great assistance to the gun-maker, as it would enable him to form an idea of the man for whom the gun is to be made. If the sportsman possesses an old gun which suits him perfectly, the gun-maker should have it, in order to copy it exactly in measurements, etc. At the author's works in Birmingham, try guns and every modern appliance are used for fitting guns, and there is always a large stock of guns of different measurements on hand, so that invariably a gun may be selected which will suit, and the shooting performance tried on the shooting range which is on the premises, the advantage of this being that the choking can be modified to the shooting required by the purchaser, and he knows exactly how the gun will perform.

## CHAPTER IV.

HANDLING THE GUN—HOW TO PUT IT TOGETHER—HOW TO CLEAN IT, AND KEEP IN GOOD ORDER—HOW TO PREVENT BREAKAGE AND DAMAGE—HOW AND WHEN TO SEND FOR REPAIRS—TEMPORARY BREAKDOWNS AND THE REMEDY—ROUGH-AND-READY REPAIRS.

THE purchaser of a new breech-loader should receive instructions from the seller as to the manner in which the gun is to be put together.

Putting the barrels on to the stock is a very easy matter to one used to it; to the sportsman it is not always a simple matter, especially if the gun be of a type new to him. The gun will generally be delivered with the barrels and stock apart. The fore-part will be upon the barrels, probably held there by the snap-bolt, which must be raised or pressed, and the fore-end at the same time lifted away from the barrels. In cheap guns it sometimes happens that the fore-part, which is easy enough to remove when the gun is together, fits very tightly upon the barrels when the action is off. It will come away easily if it be pressed in the direction of the barrels and towards the muzzle.

The gun being put together should be wiped

free from dust ; nothing tends more to clog the breech mechanism than dust.

There are two simple ways of putting barrels and stock together. Take the stock in the right hand, keep the lever open with the thumb, partly draw out the extractor in the barrels ; take them in the left hand and hook them into the breech action as shown in the illustration, care being taken to pull the hook well on to the hinge-pin ; when they are down on the bed of the breech-action, let go the action-lever, turn the gun over, and put on the fore-part.

Another way is to take hold of the breech-action firmly with the left hand ; hold the barrels perpendicularly in the right, hook the breech-action on to the barrels, and press it firmly home.

In putting a Greener Ejector Gun together—

*First.*—Pull extractors in barrel out to their fullest extent, press back the swivel and ejectors as close to the barrel lump as possible.

*Second.*—Take stock in the right hand, the barrels in the left, keep both in a *horizontal* position, the left side being uppermost.

*Third.*—Introduce the barrels into the breech-action body, hook first, and pulling hook well down on the hinge, snap the barrels home. No force is requisite.

*Fourth.*—Put on the fore-end.

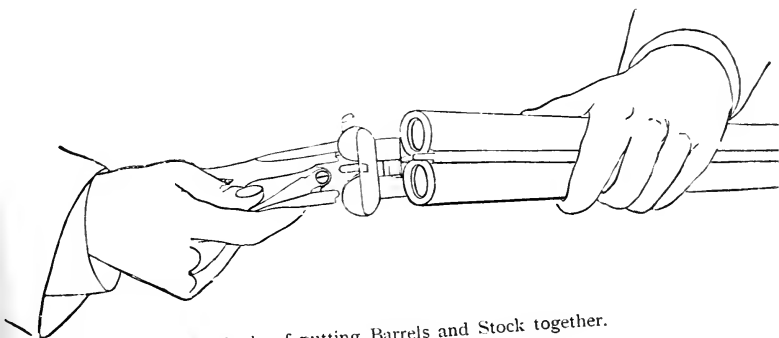
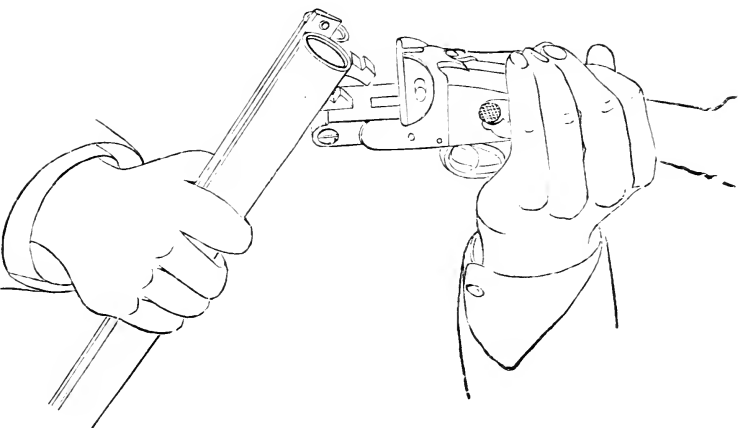
The locks must not be snapped off until the barrels are home. The gun cannot be closed

unless the locks are cocked. Should there be any difficulty in closing the gun it is proof that the gun is not cocked, and it must therefore be opened still wider before it can be closed; the barrels are taken off in the usual way. The locks may then be snapped off without injury.

In putting a gun together, providing all the parts are clean, no stiffness will be noticed, and no force requisite. In case of a *deadlock* in putting in the barrel, do not attempt to force the barrels in, but search for the *cause*. Probably, if a hammerless gun, it will require cocking; if a hammer gun, possibly the strikers are projecting through the face, and do not work freely, so that the extractor drops upon them and prevents the barrels going home.

In cheap guns the extractor often works very stiffly; this is not so noticeable when a gun is together as it is when one is trying to force out the extractor with the lifter upon the breech-action. If the extractor is rusted in, it will be impossible to force it out with the lifter on the action, and it must be made to work smoothly before the gun is put together.

Having put the gun together, it should be opened and shut several times, and any stiffness or clogginess will at once be noticed. If the gun is a snap-action, the lever should be carried home as the gun is closed. Dirt often finds its way *underneath the extractor*, and this, even in a most



Methods of putting Barrels and Stock together.

minute quantity, will frequently occasion stiffness in working, or very possibly prevent the gun from closing. Oil and dust, and sometimes a little rust, will be found in the bottom holding-down bolt ; this causes the gun to work stiffly. The gun must *never* be *forced* open, or unusual *force* used to close it. If the gun does not open *freely*, it should be carefully examined, and, on the principle that a stitch in time saves nine, it may be cleaned thoroughly, providing the cause of the stiffness is found, and the obstruction removed.

The keeping of the gun clean, and the mechanism free from grit, will ensure immunity from the annoyance of a "jam" in the field. In case of the sticking together of parts that should work freely—such as the strikers jamming in the breech-action, the extractor clogging in the barrels, or bolts or any parts becoming fast with rust—there is nothing so good as an application of petroleum ; repeated applications, and the exercise of patience, will not fail to loosen the "cement," and make even the rustiest pin amenable to the persuasion of a hand turnscrew. Having the gun together, and working freely, it will require to be used carefully. It must not be let fall heavily on its butt plate : it must not be pushed underneath the seat of the dog-cart or waggonette, and left to take its chance ; it should not be left muzzle-up or muzzle-down against a wall, a gate, or a tree. It should not be used as a crutch, an alpenstock, or crowbar. From

a critical examination of many guns returned to the author, after very little wear, he fancies they must at times be utilised for very different purposes to those for which their makers intended them. To speak more plainly, some guns are abominably abused.

The man who means to use his gun roughly is not likely to benefit by reading any number of directions as to the care of guns; there are sportsmen who do not wish to spoil their guns who act in such a manner as to injure them, and for them the following hints are intended :—

More breech-loaders get shaky in the action by being worked carelessly than from repeated firing or the use of heavy charges. The barrels of a breech-loader should never be jerked down, nor should they be thrown back into a position with a snap. The proper manner in which to load a gun is to drop the stock under the elbow, and press it firmly against the hip or the body, unfasten the lever with the right hand, and with the left grasping the barrels a few inches in front of the fore-end, lower them easily. Close the gun in a careful manner after putting in the cartridges, bringing the stock up to the barrels.

The best cartridge cases are the cheapest in the long run; when the shells are of poor quality the gas escapes at the breech end, the breech-action is unduly strained by the firing and rendered foul. Cartridge cases must fit the chamber accurately;

if a case is too large, bulged by an over-tight wad, or swelled by wet, it must not be forced into the chamber. More especially the barrels must not be rested upon a fence at the muzzle, and the leverage thus obtained used to force in tight cartridges. A cartridge case with an unusually thick rim forced into the gun will cause more strain on the breech action than much firing with the proper ammunition. If the gun is a good one, it can be preserved longer if only good ammunition is used.

Guns must be taken care of; they will then last many seasons, and give every satisfaction. When not in use they should be stored in a dry cupboard, either on a rack or in their travelling cases. The gun must not be put away at "full cock;" the tumblers may be lowered by pulling the trigger, and such is better than allowing them to remain at "full-cock;" but if the gun is laid by whilst together, two used cartridge cases, well greased, may be put in the chambers, and the locks snapped off; or the tumblers may be lowered by pulling the triggers whilst the barrels are open, but this cannot be done with guns fitted with automatic trigger-holding safeties, nor with hammerless guns which are not cocked by the dropping of the barrels.

#### CLEANING GUNS.

To clean a gun after a day's shooting. If the gun be wet, it should be wiped dry *at once*, but the



*cleaning* of the barrels and breech-action may be left until the sportsman or his servant has time to do it properly.

To clean the barrels. Use the cleaning-rod, with tow and oil, or turpentine. To remove the fouling, put muzzles on the floor, and push the rod down to within an inch of the muzzle and draw up to the chamber, or the rod may be pushed right through the barrels from the breech first time. Do this two or three times, then push right through. Use the bristle brush, or the rod with plenty of flannel; finish with the mop soaked in refined neatsfoot, pure Arctic sperm oil, or vaseline.

Never half clean the barrels; always wipe them dry and clean before finally oiling, and do not put the mop used for oiling into a foul barrel. To remove the leading from the interior of a gun barrel soak with turpentine, then clean well with a bristle, or even a wire brush, but never on any account use emery.

Always wipe the *bed, face, and joint* of the breech-action with an oily rag or flannel. A little linseed oil may be rubbed over the stock occasionally.

Before putting the gun together ascertain that all the bearing parts are free from dust or grit.

The *joint* may be lubricated with a mixture of half best Russian tallow and half petroleum.

In most hammerless guns, if the *cover plate* underneath the breech-action *body* is taken off, the

locks may be inspected, oiled, and any rust, or clogged oil and dust, removed from the *bent*.

The cocking-lifters of hammerless guns, the holding-down and top bolts, and the triggers, if they have a tendency to clog, may be touched with a knitting needle dipped in petroleum. They must be lubricated, whenever they require it, with chronometer oil, Rangoon oil, or finest neatsfoot.

Do not use a feather for the purpose of putting on any lubricant ; a wire knitting-needle or bodkin is much better.

To remove rust from inside or outside of a barrel, procure a tub, and with a kettle of boiling water well scald the barrels inside and out, wipe perfectly dry with flannel, and then oil. It is as well to do this before putting the gun aside for any length of time.

If the barrels are foul through using inferior powder, and the fouling has become hard and dry, cold water, or hot soapsuds, may be used to cleanse them. Water *boiling hot* kills rust.

Turpentine, often used successfully to clean the residue from gun-barrels, will give great trouble if it gets into the fine-fitting parts of the mechanism of the breech-action and locks, and must therefore be used with care.

Rusty or tight breeches in muzzle-loading barrels may often be turned out, providing the breech-ends of the barrels have been soaked in petroleum. Very obstinate breeches may require

to be well heated, as well as lubricated, before they can be turned out, but usually petroleum will be found a sufficient remedy for incipient rust of the working parts. All the parts of the mechanism may be cleaned with petroleum; it removes clogged vegetable and animal oils well.

#### STRIPPING GUNS.

Some sportsmen like to take their guns all to pieces and re-arrange the parts. This is not requisite, and does not in any way add to the efficiency of the arm. The gun-maker is the proper person to take apart the locks, or strip the breech-action; if there is not a practical man within easy reach the sportsman must, of course, himself endeavour to effect any repairs, but it is not advisable to interfere with any gun that functions properly, nor to practise upon any gun that works satisfactorily. If practicable, have a good gun examined each summer by its maker or a practical gunsmith.

To take to pieces a breech-loader for cleaning or repairs, first remove the fore-end and barrels; then, with a strong hand turnscrew, turn out the side-pins, and remove the locks and hammers together; next turn out the guard-pins, and remove the bow or guard; another pin will then be seen in the rear end of the trigger-plate; remove this pin (occasionally this "hand-pin" is placed in the reverse way, the head of this pin will

then be found on the top of the grip in the tang of a long break-off). The "furniture-pin" should next be turned out; this pin fastens the fore-part of the trigger-plate to the body of the breech-action, and is easily distinguished. Next remove the "breech-pin" upon the top of the tang of the break-off; in top-lever action guns the breech-pin is covered by the lever, which must be held on one side whilst the pin is being turned out. After having removed the furniture-pins, the trigger-plate and triggers may be taken from the stock, after which the breech-action may be removed entire.

To strip breech-actions, if the action is a treble-wedge-fast or ordinary top-lever double-bolt action, the first thing will be to remove the spring. To do this, first partly turn out the lever spring pin (under tang of break-off), and with a pair of pliers or pincers take hold of the spring and slightly grip it, and lift the spring towards the head of the pin. It will then be free from its bearing, and may be removed by completely turning out the spring pin. (This does not apply to spiral springs.) Next proceed to turn out the pin or pins connecting the tumbler with the bottom bolt, and remove the bolt by drawing straight out backwards. Next turn out the lever pin on top of lever, and by means of a small wire punch inserted in the lever pin-hole, knock out the tumbler. The lever may then be removed, and the top bolt, if any, will fall out.

In side-lever guns, first knock out the pivot on which the lever works, then remove spring and bolt. Snap guns with lever under-guard may be stripped in much the same manner, but the spring and lever are fixed to the trigger-plate, and the spring must be removed before knocking out the pivot-pin. Owing to the numerous complicated breech-actions that are made, we are unable to say that the above directions will be sufficient to enable an amateur to strip his gun ; but we trust they will be explicit enough as regarding guns of our own make. There are many breech-actions made that puzzle expert gun-smiths to take apart and repair, and it would be foolish for an amateur to attempt to take them apart if a gun-maker is within reasonable distance.

To strip a gun-lock, first remove the mainspring. This may be accomplished with a pair of lock vices, or a cramp may be made by filing a notch or slot in a narrow strip of  $\frac{3}{16}$  iron or steel, the size of the breadth of mainspring when at full cock. Having cocked the lock, slip the cramp up the mainspring until it catches, then release the sear and push down the tumbler. The spring being firmly held in the cramp, it may be unhooked from the swivel and removed from the lock-plate ; then unscrew the bridle-pins, and remove the bridle.

The sear may then be lifted off if the tumbler is not in bent. The sear spring will then be at liberty, and may be removed by turning out the

pin. Now the hammer should be removed ; the tumbler-pin is first turned out, and by means of a wire punch inserted in the hole, the tumbler is knocked away from both hammers and lock-plate. If a hammer fits well, it will be impossible to remove it in any other way without injury either to the hammer or the lock. The spring must not be taken out of the cramp ; it requires no cleaning except at the claw or hook. In putting a lock together, first screw on the scear spring, then the tumbler, then place on the scears and cramp the spring with a pair of pliers or tongs, place the tumbler into half-bent. Then affix the bridle, and screw it to the lock-plate. Take the mainspring, ready cramped, hook on to the swivel in tumbler, place the stud in the hole drilled for it in the lock-plate, raise the tumbler to full bent, squeeze the mainspring down close to the plate, and remove the cramp ; the lock will be ready then for affixing the hammer, which should be knocked on after placing the lock firmly on a solid block to prevent the bridle from breaking. To take apart the lock-work of the Anson and Deeley Hammerless Gun, proceed as follows :—

Having removed the barrels, snap down the hammers or tumblers, remove the cover-plate from bottom of breech-action body ; knock out with a wire punch, from the *right* side, the scear pivot, or the one nearest the stock, and remove the scears ; knock out the dog-pin, or the one nearest the

fore-end joint, and remove the cocking levers ; partly screw on the cover-plate, and carefully knock out the centre-pivot or tumbler-pin, remove the cover-plate, and the tumblers and mainsprings will drop out upon the breech-action being reversed. The scar springs lie along the bottom of action, and may be removed after turning out the pins. To put the lock-work together, first place the main-spring in the bend of the tumbler, with the stud of mainspring bearing in its proper slot, and its other extremity bearing against the under side of the nose of the tumbler ; the tumbler and spring having been placed in the slot must be forced into position with a cramp, or piece of notched wood ; knock in the tumbler-pivot half-way, insert the other tumbler and spring in the same manner, knock the wire pivot right through the lifting dogs, the scars must then be put in, and the whole covered with the cover-plate. The "Greener" Hammerless Guns, which have similar tumblers and scars and mainsprings, may be taken to pieces in the same way, but there are no dogs or lifters to be removed.

In stripping muzzle-loaders, first raise to half cock, then remove the locks by turning out the side pin, then lift off the barrels and proceed to remove the furniture, and break off as already directed for breech-loaders.

#### REPAIRS.

When possible, guns should be sent to the

makers for all repairs, as no one else is interested in making the gun last as long as possible, and at the least cost.

At the end of each shooting season guns should be sent to the gun-maker to be examined, cleaned, and if necessary repaired. Some sportsmen find it advantageous to leave the guns with the gun-maker until the reopening of the season, as he knows they will then be cared for properly, and will be returned in perfect order fit for use.

The most common damage is a dented barrel. A small dent may not be noticed by the sportsman, yet be sufficiently large to affect the shooting qualities of the gun. A bruise or large indentation is a serious damage, and a gun-barrel so injured should never be fired until properly repaired or the barrel will bulge at the bruised part.

Repairs to shaky breech-actions require careful workmanship; if much worn, new bolts, hinge-pin, etc., may be replaced at little cost, but re-stocking a gun is an expensive matter; alterations to the shape or dimensions of the stock also become expensive, as the gun requires to be "done up," *i.e.*, polished, blued, etc., after setting.

If unable to send to the makers, avoid advertising jobsters, who are in the habit of putting their own name on the gun under the pretence of having improved its shooting; also prevent all tampering with the barrels unless you know that the man to whom the gun is intrusted has the necessary tools



and skill to do the work properly. When sending for repairs send the complete gun, not any particular part.

The following are the approximate prices for such repairs as are most frequently required :—

Re-stocking hammerless guns, £3 to £6 or about one-seventh of the actual cost of the gun. Hammer guns from 21s. for keepers' guns, to £5.

Taking dents out of barrels, reducing small bulges, and repolishing and browning barrels, 10s. to 35s.

Tightening breech-actions from 10s., where new bolts, etc., are not required, to 30s.

Cleaning guns simply, hammer guns, 10s.; hammerless guns, 15s. to 20s.

Doing up an old gun, cleaning, polishing, and browning barrels, polishing and blueing furniture, colouring breech-action, cleaning, re-chequering and polishing the stock, and renovating stock, lock, and barrels, from 20s. to 70s., according to value and work done.

Other repairs are : re-browning from 10s. Re-boring barrels to remove rust and testing the gun, from 10s. per barrel. Re-boring cylinder barrels to improve shooting, 15s. per barrel. Removing choke, shooting, testing, etc., 12s. 6d. per barrel.

Altering bend of stock, 10s. to 25s.; altering length of stock, 10s.

New cocks, from 5s. each; new hammerless tumblers, from 7s. 6d. each; new mainsprings, from

8s. per pair ; new top-lever or action springs, scear springs, etc., from 2s. 6d. each.

#### EXTRA LIMBS AND TOOLS.

The following extra parts of a gun should always be taken out when out hunting, or exploring in wild countries :—Extra pair of lock mainsprings, extra hammers or tumblers, pair of extra scears, pair of extra nipples and strikers, extra side-pin, extra action or lever springs, scear springs, and extra triggers.

The following tools will be found useful :—Set of three turnscrews, mainspring cramp, or lock vice, small pair of pliers, small pincers, notched to grip springs and pins.

#### HOW TO REPAIR GUNS.

The following hints will be found useful to those who use guns far away from a gun-maker's shop, and need to repair broken-down guns for immediate use :—

The action or top-lever spring may break, but this need not in any way affect the utility or safety of the arm, only the lever will have to be moved home when the gun is closed, instead of it snapping there. The strikers of ordinary guns will become useless after continued wear, owing to the hardened hammer flattening the head of the striker, and so shortening its travel as to make miss-fires of frequent occurrence. The nipple must then be turned out

with a key or a pair of pliers, and a new spare striker inserted. In hammerless guns, the tumbler and striker being in one, and the point itself striking against the soft copper-cap of the cartridge, this flattening does not occur, the strikers being of the best mild steel, carefully hardened and tempered, and so well made, that breakages are of very rare occurrence.

To remove a dent, the following is the readiest expedient:—Having removed the barrel from the action or stock, insert in the barrel at the breech-end a solid leaden plug or bullet, as near the size of the barrel as possible. Place the barrels on a solid block with a stout ramrod or stick in the barrel, reaching within a few inches of the chamber. Then proceed to flatten out the plug or bullet by striking it with another rod and a hammer. The bullet being prevented from slipping down the barrel by the ramrod underneath, it will expand until it perfectly fits the barrel. Then proceed to force the plug—having first lubricated it—towards, and gradually past, the bruise; turn the plug half round in the barrel, and repeat the process until the bruise is raised. The barrel should be warmed during the process, by applying a hot iron to the outside of the bruised part. Great care will have to be taken not to get the plug jammed in the barrel. If a taper lead plug can be obtained, the process will be greatly simplified, and a slightly taper iron or brass plug is much better than a soft

lead one. If the barrel is bulged, a similar plug should be made, and great care will have to be taken to hammer the bruise down to the plug with a light hammer. If a hard metal plug can be obtained near the required size, it may be packed with paper until of the required diameter. The plug must be slightly longer than the bruise or dent.

To splice a broken stock, first glue the stock as well as possible, then glue round the fracture a piece of thin leather or canvas, and whilst warm tightly bind with waxed thread or a fine lace; when the whole is dry it will be almost as sound as before. The wood should be warmed before glueing, to enhance the chances of perfect success.

#### ALTERING GUNS.

Guns cannot be converted from hammer to hammerless upon any good reliable system; they cannot be made self-ejecting on the Needham or Greener principle, and with the exception of converting non-rebounding locks to the rebounding principle, it is doubtful if any conversions pay for the cost.

#### THE GUN-ROOM.

Guns and shooting paraphernalia should be kept together. If a room cannot be devoted solely to them, a capacious cupboard, or a case fitted with a gun-rack, and several drawers and shelves, will

contain a small battery and the requisite accessories.

Guns are best kept put together, and placed butt down on a gun-rack in a glass case or gun cupboard, but if the case is not practically dust-proof, the guns should be first put in pliable canvas or cloth covers. Guns kept in racks in the open room should always be kept so covered.

Loaded cartridges are best kept on an open shelf, and in a current of air; boxed up in an airtight cupboard, they will deteriorate more quickly.

After the close of the season, inspect the guns very closely, and send those concerning which there is any doubt to the gun-maker for repairs at once.

On receiving his report, it will be as well to decide quickly as to whether or not new weapons must be purchased for the next season. Some wet summer day overhaul the contents of the gun-room, put the odd cartridges handy for popping at rabbits or vermin, see that the cleaning tools are complete, that the cartridge-bags, game-bags, etc., etc., are in good condition, and make a list of the things which will be required when the season opens.

In the season the gun-room will require frequent attention if it is made use of by more than one person. The cartridges, as soon as they arrive from the gun-makers, should be transferred to the magazine or cartridge-bags of the shooter for

whom they are intended ; a cleaning-rod and gear, turnscrews and extractor put in the travelling gun-case, and the oil bottle refilled.

Useful tools in the gun-room are full-length ash or hickory cleaning-rods, and a rod with cotton-wool or fine tow kept specially for oiling barrels. It should be a standing rule never to put this oiler into a foul, dusty, rusty, or dirty barrel, but keep it for oiling only.

An oval tundish for cartridge loading, a set of turnscrews, some bristle brushes for cleaning out action slots, etc., small pliers, notched pincers for drawing out tight-fitting pins, a few steel knitting-needles, refined neatsfoot oil, vaseline, petroleum, and turpentine, may be placed near the gun-case for use as required.

## CHAPTER V.

HISTORY OF CHOKE-BORING—THE ESSENTIALS OF A GUN—THE FLIGHT OF A CHARGE OF SHOT—PATTERN—PENETRATION, VELOCITY, STRINGING, SPREAD, RANGE, RECOIL, CHOKES *v.* CYLINDERS—HOW TO LOAD—USEFUL LOADS.

## THE HISTORY OF CHOKE-BORING.

FROM references in some old works on sport, it appears that the gun-makers in the days of flint and steel were racking their brains for some improvements to make guns shoot a longer distance. Among the many plans, the one mentioned by M. de Marolles, in "La Chasse au Fusil," appears to have been the most correct in principle, viz., narrowing the bore at the muzzle by raising ridges, like the cuts of a file, for a short distance down, which, after a few shots would fill up with lead, and by that means concentrate the shot.

It is improbable that the French makers obtained their knowledge from the English, but, as the following extract from an old advertisement proves, some modification of the choke-boring system was practised in England during the last century.

Advertisement in the *St. James' Chronicle*, or *Evening Post*, May 5th to May 7th, 1789:—

“TO GENTLEMEN SPORTSMEN.—Guns matchless for shooting to be sold, or twisted barrels bored on an improved plan that will always maintain their true velocity, and do not let the bird fly away after being shot, as they generally do with guns not properly bored. The shortest of them will shoot any common shot through a whole quire of paper at 90 yards with ease. A tryal of their performance may be seen at Mr. Mellor’s, White-chapel, London.”

In an interesting work upon “American Wild-Fowl Shooting, 1879,” by Mr. J. W. Long, a chapter is devoted to the history and origin of choke-boring.

This writer claims that choke-boring is, without a reasonable doubt, an American invention, he says :

“I have most positive and reliable proof of its having been practised in this country, according to the most approved manner of the present day, over fifty years ago ; the earliest person whom I have been able to trace a knowledge of it to, being Jeremiah Smith, a gunsmith of Smithfield, Rhode Island, who discovered its merits in 1827.”

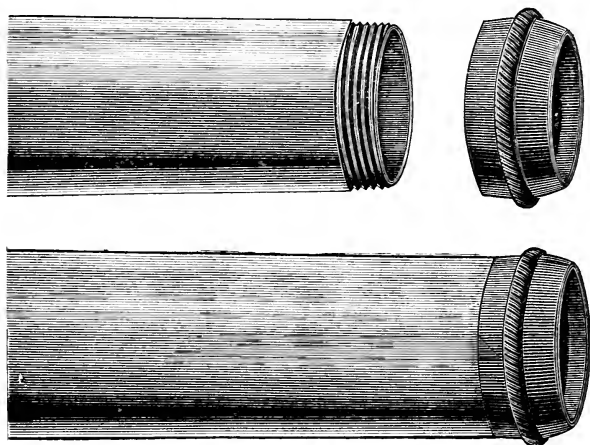
Another American invention was the Roper gun, patented in 1866. It was a single-barrel breech-loader, having an attachable muzzle of smaller bore than the barrel, which formed a choke when screwed on.

In the illustration representations are given of the barrel both with and without the attachment.



Only a limited number of these guns were made, since they were not a success.

The author had the good fortune of obtaining one, among other curios, and in 1885 gave it a good



The Roper Patent Attachable Choke-bore.

trial at the target to ascertain its qualities, and found that with the attachment there was a slight improvement, but the patterns obtained were below the standard of a modified choke of the present day.

The author had an opportunity of testing another American choke-bore, made previous to 1875. The gun was an 8-bore muzzle-loader, the property of Mr. J. W. Long, above quoted. The

results obtained were very indifferent when compared with choke-bores of his own make.

Since the London gun trial of 1875 the author's name has become so associated with choke-boring that many are under the impression that he is the actual inventor of this system. Some people have even gone to much trouble in procuring evidence of the use of choke-boring before his time, in order to prove the falsity of an imaginary claim. The author has never assumed the honour of the entire invention. His claim is the inventing of *his* system of choking, and the tools to accomplish the work, the making of choking a success, and bringing the system to the notice of the public.

In the spring of 1874 he first made experiments in choke-boring (as may be mentioned, without having any knowledge of the existence of the system previously), and was so far successful that the editor of *The Field* gave a notice of the W. W. Greener treble-wedge-fast gun, and its performance. The following extract is from *The Field* of December 5th, 1874, which is interesting as the first public notice of the capabilities of a choke-bore:—

“Mr. W. W. Greener is now prepared to execute orders for 12-bores, warranted to average 210 pellets, No. 6, in a 30-in. circle, with 3 drs. of powder, the gun weighing  $7\frac{1}{4}$  lbs. As we have always found Mr. Greener's statements of what his guns would do borne out by our experience, we are fully prepared to accept those now made.”

The readers of *The Field* refused to credit such extraordinary shooting, and this led to a special commissioner from *The Field* office being sent down to witness and verify the shooting of our guns. The patterns obtained averaged 220, and the result was highly satisfactory.

Shortly afterwards other gun-makers claimed to be in possession of the same method of boring as we had adopted, and after a lengthy discussion in *The Field*, the proprietor of that paper decided to carry out a gun trial, and thoroughly test the merits of the new system advocated by the author. Conditions were drawn up, and the trials commenced on April 26th, 1875.

In the trial the guns were divided into four classes, and guns of 8, 10, 12, and 20 calibre were entered.

In Class I. the author's guns were first; his 8-bore with an average pattern of 358·9, in 30-in. circle at 40 yards, with  $2\frac{1}{2}$  oz. No. 6 chilled shot; and the 10-bore, 241·2. This 10-bore obtained a higher figure of merit than two of the 8-bores entered and shot against it.

In Class II. for 12 gauges and under, there were 68 guns and 33 competitors. The first prize (a silver cup, value 40 guineas) was awarded the author, whose gun made an average pattern of 214. The second place was taken by a prominent gun-maker, with a pattern of 182·2.

Class III. was for guns of English boring, or

cylinders, and was won by a gun giving an average pattern of 148·5.

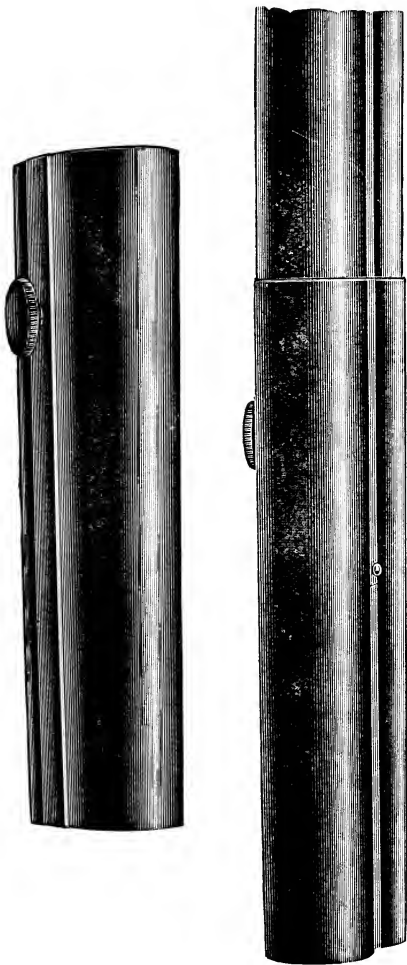
Class IV., for 20-bores. The author's 20-bore, weighing  $5\frac{1}{2}$  lbs., came out winner by several points, average pattern given, 145·3, beating all the 12-bore cylinders, both in pattern and penetration.

#### DR. MABBERLY'S PATENT ATTACHABLE MUZZLE.

The attachable muzzle was patented by Doctor Maberly, of Birmingham ; and successfully carried into practice by the author. Its chief object is at once apparent. By attaching a choke muzzle to a cylinder gun, an improvement in the pattern is obtained of 70 to 80 pellets, in a 30-in. circle at 40 yards with the standard load.

The mode of fixing the muzzles to the gun is different to the attachable muzzle patented by Mr. Turner some years ago, as will readily be seen by reference to the illustrations, which represent the muzzles fixed and separate. A gun with this appliance may be converted from a cylinder to a choke, or the reverse, in a few seconds, without the aid of tools. The attachment is slipped on the end of the barrels and fastened effectively by means of a small thumb-screw, screwing into the under rib. The expansion of the barrels, at the time of firing, entirely prevents any escape of gas around the joint.

The usual length of the muzzles for a 12-bore gun is about 5 inches,  $2\frac{1}{4}$  of which overlaps the end



Dr. Mabberley's Attachable Choke.

of the barrels, forming a perfect joint. It may be made longer, when so required for lengthening short barrel guns built expressly for covert shooting, or for converting ordinary guns into wild-fowling guns, or any other particular purpose.

The balance is retained when the muzzles are fixed by weighting the butt with a barrel cleaner inserted in the stock. It is so contrived that the cleaner may be packed inside the muzzles when out of use, for the greater convenience of carrying in the pocket. It is a neat arrangement, and answers the purpose of an extra pair of choke-bore barrels.

It has been thoroughly tested both at the target and game for the past twelve months, and has been found perfectly satisfactory.

The price for fitting the attachable muzzles to old guns will be from two to three guineas, according to the value of the gun.

#### PATTERN.

When a gun is said to make a pattern of 200, it means that 200 is the average number put within a circle 30 in. in diameter on the target, the butt of the gun being forty yards—not paces—from the target, the load being 3 drams of black powder, or the equivalent in nitro powder, and  $1\frac{1}{8}$  ounces of No. 6 shot, 270 to the ounce (304 pellets to  $1\frac{1}{8}$  ounces), which is called the standard load, and originated at the Field Gun Trials of 1875, when the charge of shot was first counted.

It is necessary that the pellets of a charge should be counted into the case if a correct estimate of the gun's shooting is required.

The target should be 3 ft. 6 in. square, and the bull's-eye marked in the centre. After the gun is fired, to find the pattern, describe a circle around the thickest of the pellets. This can be done by taking a piece of wood with two nails knocked through 15 in. apart, holding one nail in the centre, and marking the target with the other. When shooting at paper targets, substitute a black lead pencil for one of the nails. The best of the pattern is thus obtained, which is called the selected circle. Unless this is done, should the aim be defective, when using a small target, a wrong estimate of the gun's shooting powers may be arrived at.

#### PENETRATION.

To find the penetration a rack is used, consisting of a wooden frame, so constructed to hold sheets of strawboard about  $\frac{1}{4}$  of an inch apart; the sheets measure 6 in. by 7 in., and weigh 25 to the pound.

The rack is placed about 4 ft. from the ground, and fired at from the standard distance (40 yards); the number of sheets pierced by one or more shots is the penetration.

The purposes for which a sporting-gun is required are various. The author has been commanded to build one gun which shall be effectual

at all game, from snipe to an elephant; and although this weapon was tolerably successful at everything, it is not to be supposed that it was actually fitted for anything except the elephant. Another customer of the author's, to decide a bet, shot a couple of snipe with a heavy elephant rifle of 8-bore. There is, therefore, no actual limit to the capabilities of any weapon until trial has been made. The collector who requires humming-birds, and the wild-fowler who thinks of getting wild geese, will arm themselves very differently.

Again, some guns have to be carried throughout a long day's walk; in other sports the gun is only in the hand the couple of seconds requisite to aim and fire. It is, therefore, evident that what is desired for one sport is of little importance in a gun desired for another sport.

There are certain essentials, however, which should be possessed by all varieties of guns. Amongst the chief of them are:—Facility in loading at the breech, freedom from danger to the user or his companions, simplicity of mechanism, speed in manipulation, handiness, lasting power.

#### LARGE-BORE GUNS.

As stated in Chapter I., large-bore guns are made for wild-fowling, but the subject is too large to be treated fully in this book. In addition to the information already given (p. 37) some instances of the shooting of large guns are given



on p. 369. Fuller particulars are to be found in "The Gun and its Development," and in books devoted solely to the sport of wild-fowling.

#### THE PIGEON-GUN.

This is the most powerful variety of the 12-bore gun; it must be so built as to meet the rules of the chief clubs; in England the bore must not be larger than 12, nor the gun heavier than 8 lbs.; the charge to be used must not exceed four drams of powder and  $1\frac{1}{4}$  ounces of shot. On the Continent and in America 10-bores are allowed, but there is usually some restriction as to charge. The pigeon-gun may be made with hammers or hammerless, preferably the latter. It should *not* have a trigger bolting safety, and an automatic trigger safety for this species of gun is the greatest mistake that can be made.

The shooting required will in some measure depend upon the distance at which the user is generally placed, it being required to have the largest possible killing circle at one yard beyond the trap with the first barrel, and at five yards with the second. In no class of gun is uniformity and regularity of shooting more essential than in the trap-gun. The weight may be from  $\frac{1}{2}$  to  $\frac{3}{4}$  of a pound greater than in the gun carried for game-shooting, but it is important that the balance be perfect.

An ideal pigeon-gun will balance at about 3 inches from the breech, weigh about  $7\frac{1}{2}$  lbs., and fire the full charge of shot ( $1\frac{1}{4}$  ounce) with the



W. W. Greener's Pigeon-Gun.

greatest uniformity ; the gun will be hammerless without any safety bolt ; it must have a strong breech-action and be fitted with the Greener cross-bolt. The barrels will be chambered for  $2\frac{3}{4}$ -inch cases, and in it a charge of 50 grains of Schultze powder may be used without excessive recoil. The gun may have an engine-turned, flat, or half hollow rib. Good shots prefer that the gun should shoot high at forty yards, and that the gun throws the pellets well to the centre. Other shots, standing nearer the traps, do not want extra elevation, and ask for as large a killing circle as can be obtained at 30 yards ; with  $1\frac{1}{4}$  ounce of shot this is a circle of about 30 inches in diameter, and means a very close shooting gun. An average pattern of 250 in a 30-inch circle at 40 yards is the very best the 12-bore gun will do with black powder. Ordinarily a gun is required to shoot as closely as possible at the trap. The bird must be shot at quickly, and the nearer to the trap it is grassed the better. Naturally, the pigeon-shooter requires as large a killing circle as is compatible with a close pattern. He requires the pattern to be equally spread over the "killing circle," to have the greatest velocity, and the pellets to keep together as much as possible ; but of greater importance than all these, it is required that the gun always perform alike. Uniformity in shooting is a quality only found in the best of guns, and even cylinders, when most carefully bored, will make occasional bad shots,

any one of which would allow of the pigeon escaping at twenty-five yards. Therefore, the gun must never shoot wildly, but be always good alike.

In deciding as to the amount of choke required, it must be borne in mind that the pattern made at any given distance does not fairly represent the position of the charge at any given moment. The pellets of the charge issue from the muzzle as compactly as a ball, then, having individual velocities—some go ahead, others lag behind, so that, roughly speaking, there is a distance of twelve feet between the first and last pellet when the bulk of the pellets arrive at forty yards; but of this feature more will be explained later.

Pigeon guns should be chambered for the  $2\frac{3}{4}$  or  $2\frac{7}{8}$ -inch cartridge case; 3-inch chambers are now rarely used and offer no advantage, the shooting with guns so chambered being inferior to those having the shorter chamber. The highest patterns the author has obtained were made with the nitropowders—"E.C." and "Schultze"—using 47 grains, with  $1\frac{1}{2}$  ounces of No. 6 shot and wads of  $11\frac{3}{4}$  gauge. It is not unusual to get average patterns of 270 on the 30-inch circle at 40 yards, and average patterns as high as 280 are sometimes obtained. It must be borne in mind that the powder is subject to slight variation, and that guns rarely shoot exactly the same from day to day, even when using the same cartridges. More powder tends to reduce the pattern, but as much

as 52 grains may be employed in a good pigeon gun without making the gun scatter too wide for all trap purposes. In some guns these high patterns were obtained with ordinary felt and pink-edge wads of  $11\frac{3}{4}$  gauge, and with Swedish cup wads in other guns. For 25 yards rise, and if a larger killing circle be required, it may be obtained by using more shot—if this be allowable by the rules of the competition—or by using shot of a smaller size. A good shooting pigeon gun will give with No. 8 shot an average pattern of 375, well distributed over the 30-inch circle. For those shots who are handicapped beyond 30 yards No. 5 shot in the second barrel will be found the most suitable, as the velocity is higher, though the killing circle is slightly smaller. The pattern with No. 5 (218 to the ounce) should average 200 pellets. The Swedish cup wads improve the shooting of the gun, but they also greatly increase the internal pressure, and therefore are not suitable for light game-guns. In specially built pigeon guns they should be of great value, especially to shots handicapped beyond 32 yards. With charges of 45 and 48 grains of Schultze and E.C. powders and  $1\frac{1}{4}$  ounces of No. 6 shot, thirty consecutive shots from one barrel gave an average pattern of 262. The author tried this gun with smaller charges—42 grains and  $1\frac{1}{8}$  ounce of No. 6, and the average pattern was 248; an average of 236 was obtained in a string of 42 rounds of Schultze, E.C. and black,

and  $1\frac{1}{8}$  ounce of shot ; records not often equalled, and probably never surpassed, with ordinary wads.

#### FAVOURITE MAKERS OF PIGEON-GUNS.

When reading the reports in the English papers of the events at Hurlingham and the Gun Club, it will be noticed that only a few different makes of gun are used there. These few London gun-makers cater specially for this particular trade by sending their representatives to attend every event, etc., and have thus secured the monopoly, not that their guns shoot any better than guns by other London or provincial makers, nor is it to be assumed that they alone can make good shooting pigeon-guns. This system of advertising would not suit every gun-maker. The author, who makes numbers of pigeon-guns for use all over the world, and which have been used with such great success for many years past, could not give his special attention to these clubs only. The author has tested guns of good makers and has found them give very low patterns occasionally, for instance, one shot will give a pattern of 260, the next will not put more than 50 pellets on the target. The larger the charge of powder used the more frequently will this happen. Modified chokes are the worst in this respect ; for uniformity of shooting there is nothing like a full choke-bore. The shooting of a pigeon-gun should not be passed which makes a less pattern than 150 with black powder.

THE GAME-GUN.

The best all-round gun for sporting purposes is the 12-bore with 30-inch barrels, weighing about 7 lbs., providing the sportsman can carry and handle a weapon of this weight.

Twelve-bores much under 7 lbs. will not shoot a heavier charge than  $3\frac{1}{4}$  drams and  $1\frac{1}{8}$  oz. with comfort to the shooter. If  $7\frac{1}{4}$  lbs.,  $3\frac{1}{4}$  drams and  $1\frac{1}{4}$  oz. If  $7\frac{1}{2}$  lbs., the charge may be  $3\frac{1}{2}$  drams and  $1\frac{1}{4}$  oz.; over  $7\frac{1}{2}$  lbs., guns are usually built for extra-long cartridge-cases and special charges.

The usual full-choked 12-cal. gun with 30-inch barrels, and weighing 7 lbs., should average—

AT FORTY YARDS.

Charge.		Pattern.		Penetration of Strawboards	Mean Velocity.	Force at Impact.
Drams of powder.	Oz. of shot.	Square 10" centre.	30 in. circle.			
$3\frac{1}{4}$	$1\frac{1}{8}$ No. 8	92	320	15	800	0'80
3	$1\frac{1}{8}$ No. 6	55	215	20	839	1'80
$3\frac{1}{4}$	$1\frac{1}{8}$ No. 6	51	210	21	857	1'83
$3\frac{3}{8}$	$1\frac{1}{8}$ No. 6	39	200	22	912	1'87
$3\frac{1}{4}$	$1\frac{1}{4}$ No. 6	58	240	21	864	1'85
3	$1\frac{1}{8}$ No. 5	35	175	22	878	1'89
$3\frac{1}{4}$	$1\frac{1}{4}$ No. 5	45	190	23	882	1'91
$3\frac{1}{4}$	$1\frac{1}{4}$ No. 4	40	160	24	900	2'81
$3\frac{1}{4}$	$1\frac{1}{4}$ No. 3	38	135	25	950	3'16
$3\frac{1}{4}$	$1\frac{1}{4}$ No. 1	35	105	26	980	4'18
$3\frac{3}{8}$	$1\frac{1}{4}$ No. 1	33	100	30	988	5'30

AT SIXTY YARDS.

3	$1\frac{1}{8}$ No. 6	29	110	10	652	0'93
$3\frac{3}{8}$	$1\frac{1}{8}$ No. 6	36	100	11	723	1'28
$3\frac{3}{8}$	$1\frac{1}{8}$ No. 5	28	89	14	757	1'47
$3\frac{3}{8}$	$1\frac{1}{8}$ No. 4	17	70	18	786	2'00
$3\frac{1}{2}$	$1\frac{1}{4}$ No. 1	15	50	21	799	2'46

Guns with 27-inch barrels will be found to permit of better marksmanship than with shorter barrels, and consequently, unless there is a good reason for doing so, guns should not be made with shorter barrels than 27 inches.

Light guns and guns with short barrels will shoot 3 drams and  $1\frac{1}{8}$  ounce of shot, and an average pattern of 200 with No. 6 shot may be obtained. The superiority of this gun to guns of smaller bore may be judged by the following figures.

THE 16-BORE FULL-CHOKE, with barrels 30 inches in length, and the gun weighing  $6\frac{1}{4}$  lbs., should average—

## AT FORTY YARDS.

Charge.		Pattern. 30-inch circle.	Penetration of Strawboards	Mean Velocity.	Force at Impact.
Drams of powder.	Oz. of shot.				
2	1 No. 5	160	22	763	0'98
$2\frac{1}{2}$	1 No. 6	190	19	814	1'35
$2\frac{1}{2}$	1 No. 5	155	23	847	2'49
$2\frac{3}{4}$	1 No. 6	180	21	833	2'27
3	1 No. 6	174	22	858	2'33
$2\frac{3}{4}$	1 No. 5	155	25	856	2'48
$2\frac{1}{2}$	1 No. 1	85	29	936	3'00

## AT SIXTY YARDS.

$2\frac{3}{4}$	1 No. 6	95	9	635	1'10
$2\frac{1}{4}$	1 No. 5	85	12	675	1'26
$2\frac{1}{2}$	1 No. 1	45	19	830	1'52

Weight from  $5\frac{3}{4}$  to  $6\frac{1}{2}$  lbs. Recoil 82 lbs. For 16 and smaller bores it is a good plan to have the right barrel an improved cylinder.

THE 20-BORE is the smallest bore sought after



by the general sportsman ; a gun of  $5\frac{1}{2}$  lbs. weight and with 28-inch barrels, may be taken as representing fairly the 20-cal. class, and should average—

AT FORTY YARDS.

Charge.		Pattern. 30-inch circle.	Penetration of Strawboards	Mean Velocity.	Force at Impact.
Drams of powder.	Oz. of Shot.				
$2\frac{1}{4}$	1 No. 8	230	13	756	0'67
$2\frac{1}{4}$	1 No. 6	180	18	772	1'37
$2\frac{1}{2}$	7 No. 6	160	19	849	1'94
$2\frac{1}{2}$	7 No. 5	120	22	890	2'37
$2\frac{1}{2}$	1 No. 1	65	29	950	2'72
32 grs. Schultze	4 No. 6	150	20	820	2'00

AT SIXTY YARDS.

$2\frac{1}{4}$	1 No. 6	60	9	650	0'76
$2\frac{1}{4}$	1 No. 5	35	18	684	0'89

Weight not less than  $5\frac{1}{4}$  nor more than 6 lbs. Recoil under 90 lbs.

THE 28-BORE should have 25- or 27-inch barrels, which will require but little choking, and average—

Charge powder.	Charge powder.	30-inch Pattern.	Cardboard penetration.	Mean velocity.	Force at impact.
$1\frac{1}{2}$ drams	5 oz. No. 8	150	13	705	0'66
*32 grs. Schultze	5 oz. No. 6	124	22	940	1'96
$1\frac{1}{2}$ drams	5 oz. No. 6	130	27	720	1'87

The weight should not be less than  $4\frac{1}{4}$ , nor more than  $4\frac{3}{4}$  lbs. Recoil 60 lbs. The 28-bore must not be loaded with 1 oz. of shot, as is too often done. This calibre especially is too frequently much over-loaded.

\* Over-loaded. This charge has been too frequently used ; 26 grains does better.

## THE FLIGHT OF A LOAD OF SHOT.

The shooting powers of a gun and the relative values of various loads, powders, etc., used in it are ascertained by comparing the pattern, penetration, velocity, stringing, spread and range of the shot fired.

The pattern is the *shown* shooting of a gun, the only visible proof of a gun's powers—the killing of game being in some measure dependent upon the skill of the sportsman. The *pattern* of a gun, besides being the most reliable test applicable to a gun, is fortunately the easiest. To ascertain a gun's merits, fire it at the largest sheet of paper obtainable—for most guns forty yards will be found the best distance. For comparative results count the number of perforations formed in a circle 30 in. in diameter marked upon the paper. A good close pattern is a guarantee that the gun has sufficient force to kill at that distance. The greater the velocity of the *mass* of pellets of the charge the closer is the pattern. No close-shooting gun has inferior penetration, and, generally speaking, the less distant each individual pellet is from the common centre depicted on the target, the less is the distance between the first and last pellets of the charge—in other words, a *close* pattern means uniform velocity in the pellets of the charge. Occasional bad patterns, or patchy patterns, prove the gun to be improperly bored. The closer the pattern at forty yards, the longer the killing range of the gun.

Penetration is the result of the velocity of the shot.

The velocity of shot depends upon the nature and quality of the explosive used, the perfect finish and shape of the barrels, the rotundity, size, and specific gravity of the pellets. The details of the various deviations in results obtainable by different grains of powder, different gauges of guns, different sizes of shot, chokes and cylinders, would be tedious.

Stringing of the charge is the result of the different velocities of pellets in the one charge; for instance, with a cylinder gun, 42 grains of nitro-explosive and  $1\frac{1}{8}$  ounce of No. 6 shot, the front pellets reach the target in  $\cdot 138$  of a second from the time of leaving the muzzle, but the last pellets to reach the target arrive after the expiration of  $\cdot 187$  second.

This means that whilst the first pellets may strike a bird at forty yards the slower pellets have not reached a distance of thirty yards from the gun.

As a matter of fact, about 5 per cent. of the pellets of the charge arrive simultaneously at the target at forty yards distance from the gun; these pellets are *closely* followed by 25 per cent. to 30 per cent. of the pellets of the charge if the gun be a good one, and this 30 per cent. to 40 per cent. of the pellets represents practically the actual killing value of the shot, for the remaining pellets flying irregularly, and at a much lower velocity, tail off so rapidly that little reliance can be placed upon them.

The spread of the charge of shot or its divergence

from the line of flight differs with individual guns, it being the gun-maker's object to make the shot fly compactly. A few stray shots from the charge will occasionally diverge to the extent of twenty yards at a range of forty yards; 16, 18, or 20 ft. is the usual limit of the divergence of outside pellets, at forty yards' range. Guns bored cylinder, and guns with sudden chamber cones cause the shot to spread more irregularly than choke-bores.

The range of a gun is dependent upon the velocity of the pellets of the charge, a gun in which the spread and stringing are less has a greater range than one which will send a few pellets at high velocity: there is the momentum of the charge in flight as well as the momentum of the individual pellets of which it is composed.

It is impossible, without going deeply into figures, to prove the many variations in the flight of a charge of shot caused by differences in the loading, size of shot, size of bore of the gun, grain of powder, composition of powder, and other matters which more or less modify a gun's shooting. We reproduce a few standard diagrams and figures for reference, but must refer the reader interested in the subject to "Modern Shot Guns" for further details upon these points.

The following summary gives the actual mean velocity in feet per second of the body of the charge of shot at the ranges indicated, measured by Mr. R. W. S. Griffith:—

With E.C. powder in a 12-bore, using  $3\frac{1}{2}$  drams and  $1\frac{1}{2}$  of No. 1, the velocity at 50 yards is 811 foot seconds.

CHARGE.		5	10	15	20	25	30	35	40	45	50	55	60
		Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.
drms. oz.													
$2\frac{1}{2}$	I No. 1	1039	1022	1001	979	951	929	904	880	856	829	802	780
3	I „	1185	1168	1150	1120	1076	1039	992	939	919	880	852	831
3	$I\frac{1}{8}$ „	1169	1140	1126	1089	1054	1003	962	935	914	891	861	825
$3\frac{1}{2}$	$I\frac{1}{8}$ „	1220	1198	1175	1143	1103	1060	1012	966	938	914	890	876
$3\frac{1}{2}$	$I\frac{1}{4}$ „	1172	1151	1130	1111	1073	1029	989	949	908	867	835	799
4	$I\frac{1}{4}$ „	1239	1221	1205	1181	1144	1106	1066	1022	976	936	909	863
$2\frac{1}{2}$	I „	5 996	975	953	924	886	850	831	792	771	744	710	684
3	I „	5 1160	1133	1106	1066	1021	969	922	879	840	801	764	729
3	$I\frac{1}{8}$ „	5 1127	1034	1070	1047	1014	970	914	875	835	790	741	672
$3\frac{1}{2}$	$I\frac{1}{8}$ „	5 1182	1164	1136	1088	1045	1002	960	907	875	838	799	757
$3\frac{1}{2}$	$I\frac{1}{4}$ „	5 1130	1111	1088	1058	1026	979	931	880	834	790	741	689
4	$I\frac{1}{4}$ „	5 1207	1190	1171	1134	1094	1051	994	932	892	853	810	764
$2\frac{1}{2}$	I „	6 990	963	941	905	863	829	804	776	752	722	690	651
3	I „	6 1154	1130	1100	1051	1012	950	904	862	826	770	730	694
3	$I\frac{1}{8}$ „	6 1119	1091	1063	1035	999	942	890	850	808	769	717	652
$3\frac{1}{2}$	$I\frac{1}{8}$ „	6 1175	1153	1120	1079	1032	986	940	894	861	825	780	723
$3\frac{1}{2}$	$I\frac{1}{4}$ „	6 1121	1100	1081	1050	1015	970	912	858	810	762	714	663
4	$I\frac{1}{4}$ „	6 1199	1177	1159	1122	1082	1034	977	907	850	816	774	734
$2\frac{1}{2}$	I „	10 922	892	872	841	802	760	703	670	622	551	465	370
3	I „	10 1120	1094	1071	1029	959	891	809	751	704	630	559	440
3	$I\frac{1}{8}$ „	10 1076	1041	999	941	886	831	775	710	540	465	430	375
$3\frac{1}{2}$	$I\frac{1}{8}$ „	10 1126	1096	1060	1012	965	892	830	781	711	630	550	460
$3\frac{1}{2}$	$I\frac{1}{4}$ „	10 1066	1041	1017	980	940	896	834	760	706	620	540	446
4	$I\frac{1}{4}$ „	10 1145	1115	1090	1045	987	927	964	792	720	642	551	495

All these figures were obtained with a Greener choke 12-bore gun, with Schultze powder and good wadding. Inferior wadding will produce lower velocity, especially at the longer ranges.

CHOKE-BORES v. CYLINDERS.

The larger the killing circle and the greater the range, the greater the efficiency of the gun. To make a charge of shot fly compactly, to increase the velocity of the mass of the pellets, to prevent the

divergence or straying of the shot, it has been found that the choke-boring of the gun is most effectual.

The adjoining diagrams will give at a glance an approximate idea of the difference in the flight of a charge of shot from a choke-bore and a cylinder gun, and also the difference caused by an increased charge of powder in the choke, but as the velocity varies at the different ranges, the diagrams do not show accurately the approximate divergence at all ranges.

Explanation of diagrams on pages 162, 163 :—

Results obtained with a choke-bore gun loaded with 42 grains of Schultze gunpowder and  $1\frac{1}{8}$  oz. No. 6 chilled shot (304 pellets), fixed target (4 ft. diameter), moving target ( $\frac{1}{25}$  scale).

#### DISTRIBUTION OF THE 304 PELLETS.

At 10 yards.—All in the 30-in. circle.

At 20 yards.—Ditto. (*See* diagram, page 162.)

At 30 yards.—278 in the 30-in. circle ; 24 in the 30-48-in. belt ; and 2 outside the 4-ft. circle. (*See* page 163.)

At 40 yards.—233 in the 30-in. circle ; 65 in the 30-48-in. belt ; and 6 outside the 4-ft. circle.

At 50 yards.—160 in the 30-in. circle ; 90 in the 30-48-in. belt ; and 54 outside the 4-ft. circle.

At 60 yards.—100 in the 30-in. circle ; 95 in the 30-48-in. belt ; and 109 outside the 4-ft. circle.

Results obtained with a cylinder gun loaded as above :—

At 10 yards.—All in the 30-in. circle.

At 20 yards.—264 in the 30-in. circle; 38 in the 30-48-in. belt; and 2 outside the 4-ft. circle. (See diagram, page 162.)

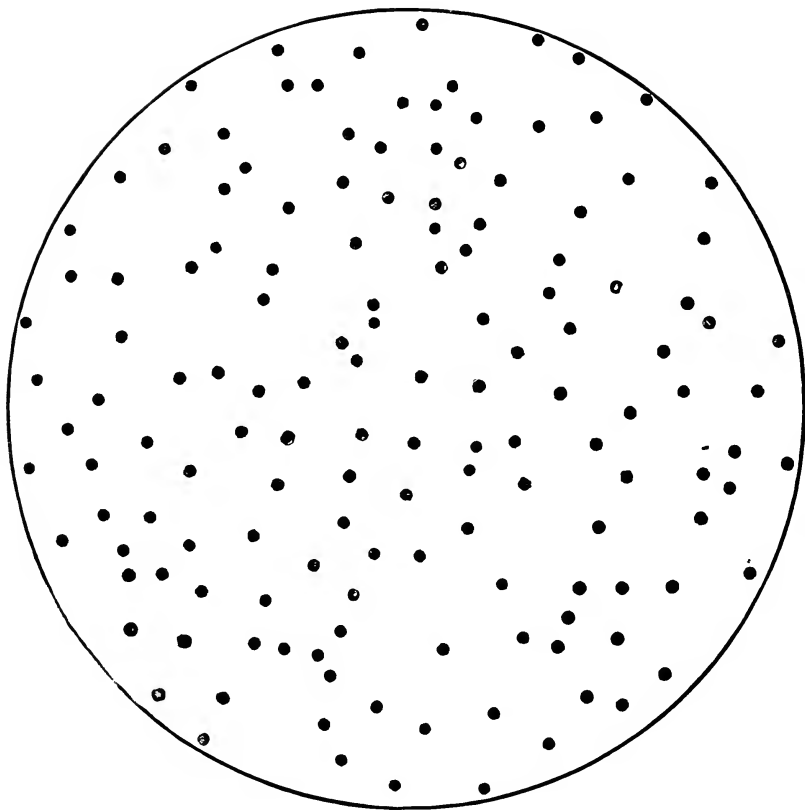
At 30 yards.—172 in the 30-in. circle; 90 in the 30-48-in. belt; and 42 outside the 4-ft. circle. (See page 163.)

At 40 yards.—130 in the 30-in. circle; 103 in the 30-48-in. belt; and 71 outside the 4-ft. circle.

At 50 yards.—76 in the 30-in. circle; 86 in the 30-48-in. belt; and 142 outside the 4-ft. circle.

At 60 yards.—61 in the 30-in. circle; 57 in the 30-48-in. belt; and 186 outside the 4-ft. circle.

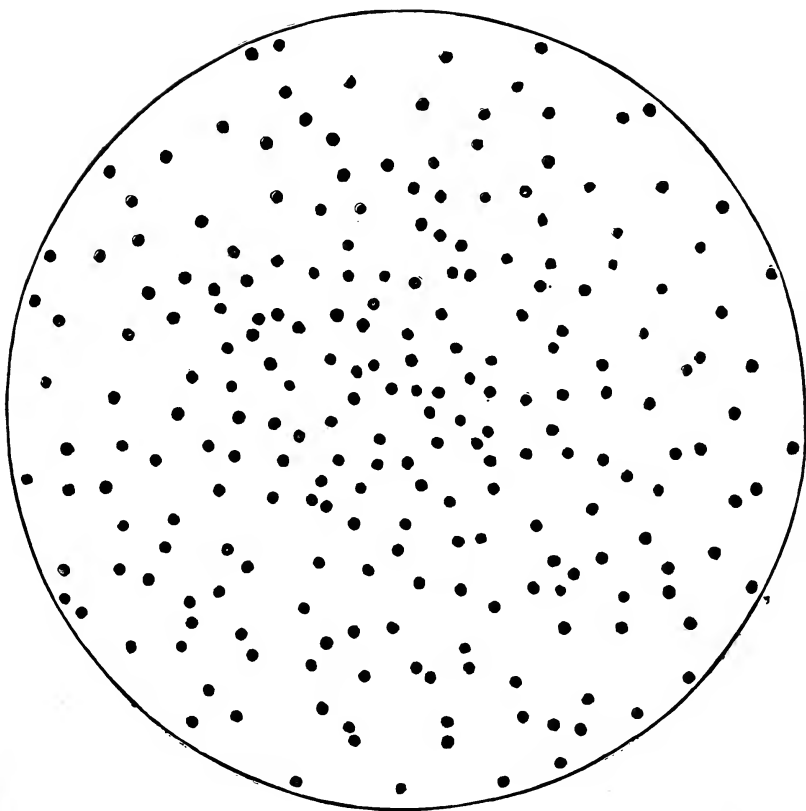
The *best pattern* is that of the choke-bore gun, and sportsmen seem slow to grasp the fact that pattern is the all-important factor in the killing range of the gun. The author made a series of experiments by which he ascertained that it requires at least four pellets of No. 6 shot (chilled) to kill a pigeon, excepting, of course, such flukes as a pellet striking the head or breaking the neck, and the pigeon, if struck by six shots, none of which might prove immediately mortal, should be dropped at once by the aggregate. An old or true cylinder gun will not, upon the average, put three pellets into a pigeon thirty yards distant. The cylinder gun must, therefore, be considered practically useless at this distance; for, providing the pigeons were fairly struck, and in the centre of the charge, not more than one out of three would be



Facsimile of Shooting of an Improved Cylinder at forty yards, with  
3 drs. Black Powder,  $1\frac{1}{8}$  oz. No. 6 Shot (reduced by photography).

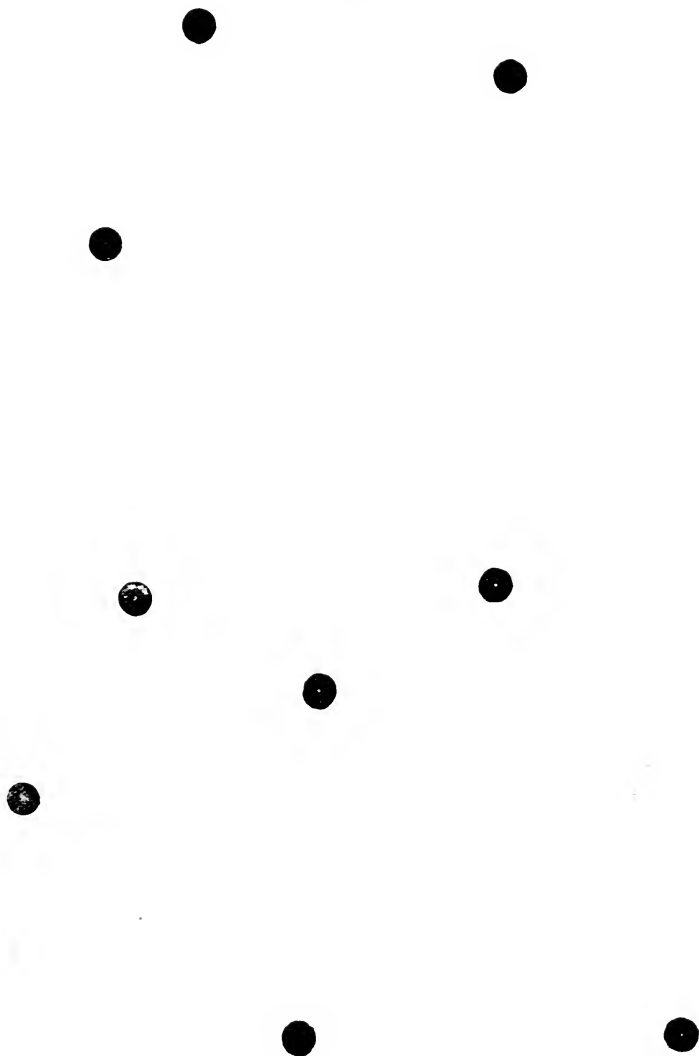
144 pellets in 30-inch circle.



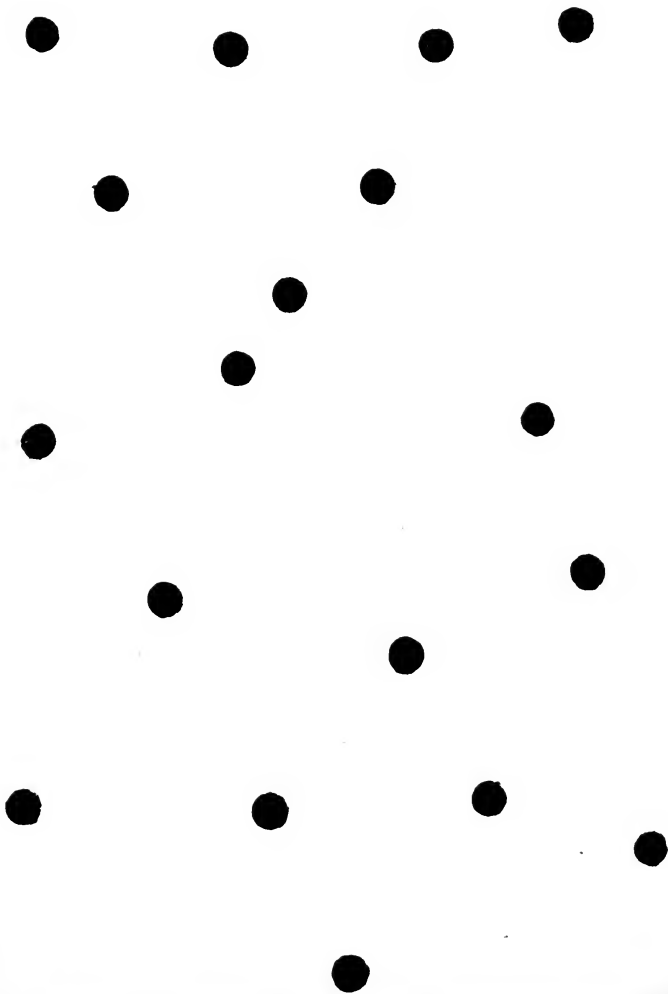


Facsimile of the Shooting of a W. W. Greener Gun with Schultze Powder and No. 6 Shot (reduced by photography).

226 pellets in 30-inch circle.

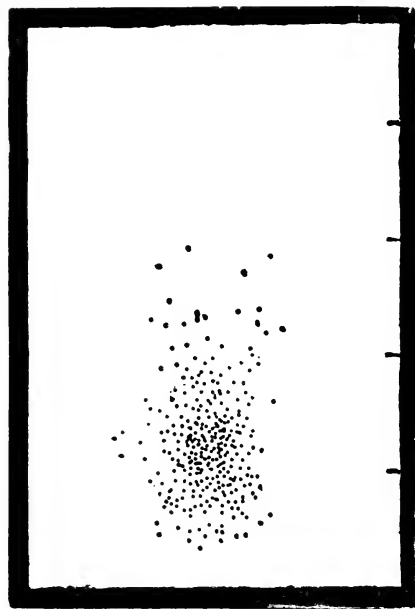


Fac-simile of the shooting selected from the centre of the pattern of an improved cylinder bored gun, at 40 yards, 3 drams of No. 4 powder, and  $1\frac{1}{8}$  oz. No. 6 shot.

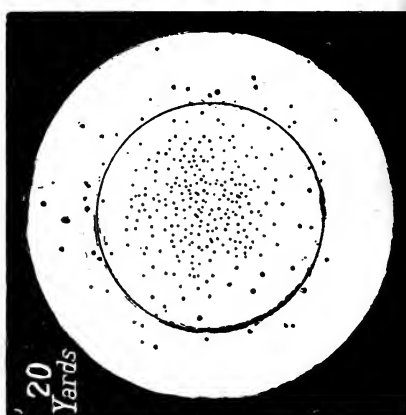
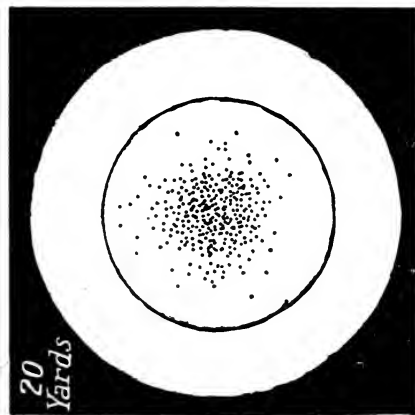
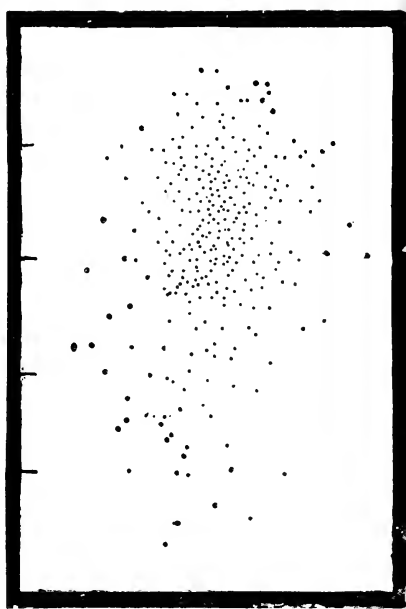


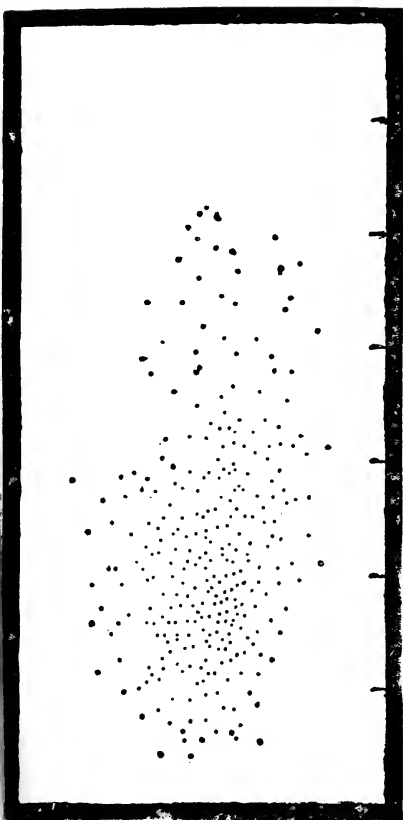
Facsimile of the Shooting of a Full Choke bored Gun at 40 Yards,  
3 drams of No. 4 Powder, and  $1\frac{1}{8}$  oz. No. 6 shot.

These two illustrations represent exactly the distance the pellets are  
apart; those reduced by photography may convey a wrong impression  
on account of their reduced scale not being taken into consideration.

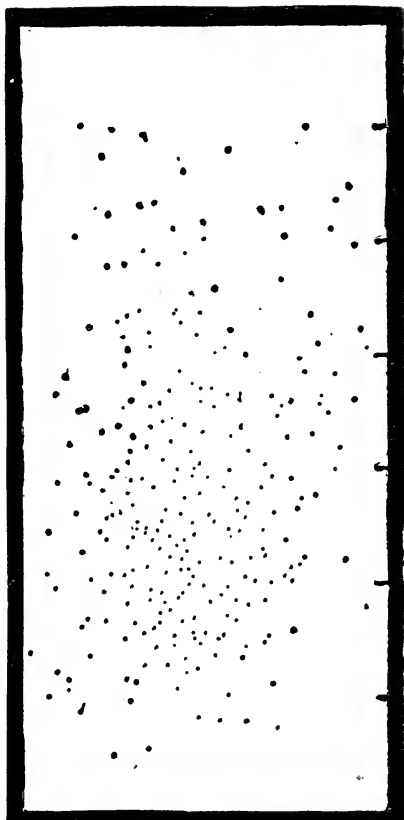


Choke at 20 yards.

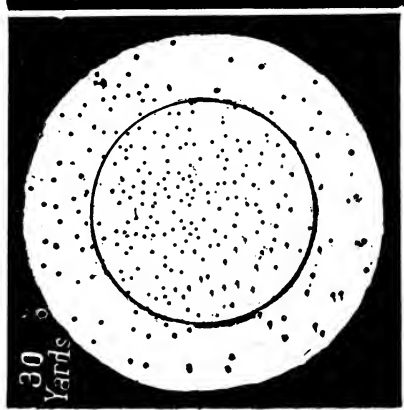
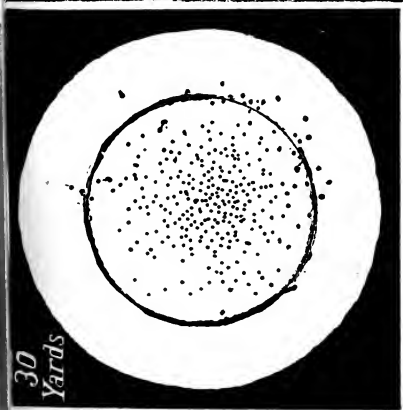




Choke at 30 Yards.



Cylinder at 30 Yards.



killed and gathered. To ensure four pellets being put into a pigeon, a pattern of at least 200 in the 30-inch circle is necessary. The author has repeatedly killed pigeons at 40 yards distance with a choke-bore gun (capable of making a pattern of 240 with the usual load) when using the small charge of  $2\frac{1}{4}$  drs.  $1\frac{1}{4}$  oz. No. 6, thereby proving that there is ample penetration to kill, and that "pattern" is required, not only penetration, as stated by the upholders of the cylinder.

Anyone wishing to verify this statement should make a trial by placing a live pigeon in a small thin box, just large enough to hold the pigeon broadways on, the front to be covered with thin paper. Hang the box in the centre of the target. After firing at it, the pellets can easily be counted in the pigeon, and also in the 30-inch circle.

By this test all doubt as to a misdirected shot is removed.

A gun, by varying the load, can always be made to spread, so that for covert or rabbit shooting a choke-bore gun, loaded with scatter charge and the quantity of shot slightly reduced, may be used with better effect and less danger than a cylinder. There is a prejudice against choke-bores amongst a certain clique of English sportsmen, but the system of boring has such enormous advantages and adds so greatly to the gun's range and power that it continues to gain rapidly in favour.

The barrel may be contracted from, say  $\frac{5}{1000}$ ths

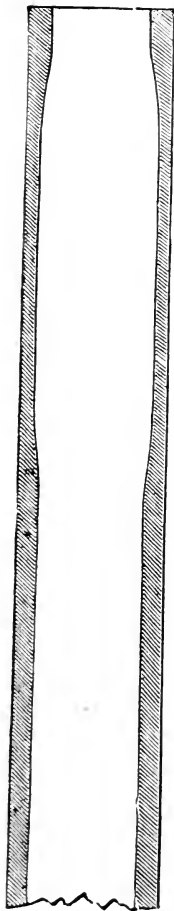
of an inch, being then almost cylindrical to  $\frac{3}{1000}$ ths of an inch when it is an extra full choke. The graduations are as follows :—

With a twelve bore gun, standard load distance and conditions, the ordinary <i>full choke</i> will make an average pattern of ... ..	215 pellets
The half-choke ... ..	185 „
The quarter-choke ... ..	160 „
The improved cylinder ... ..	140 „
The old, or true cylinder ... ..	115 „

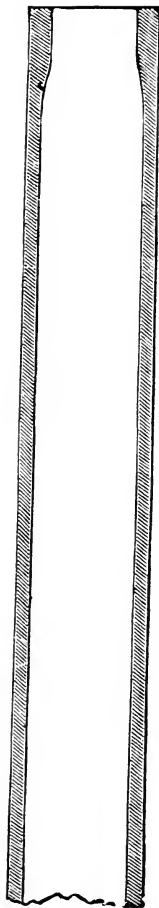
Better shooting than average of 215 can be obtained from an extra full-choked bored 12-bore gun, by using Schultze E.C. or S.S. powder.  $1\frac{1}{4}$  oz. of shot improves the pattern of choke guns from 10 to 30 pellets when using No. 6 shot, it fills up the pattern just round the 30-inch circle.

No increase in the charge of shot will improve a cylinder.

A gun must be more or less choke-bored, unless the sportsman wishes to handicap himself needlessly. The invention of choke-boring is certainly as important as any of the improvements introduced into the firearms industry during the last half-century, and notwithstanding the assertions of misinformed persons to the contrary, the choke is rapidly growing in public favour. Not only does choking cause the gun to shoot more closely; it also makes it shoot more regularly, more uniformly,



The Recess, or Fairburn Choke.



The True, or Greener Choke.



and, to a very great extent, prevents the erratic flight of a few pellets in a line widely divergent to that taken by the body of the charge. For ordinary sporting purposes a gun which shall give its largest killing circle at 30 yards with the first barrel, and at 40 with the second, will be found the most convenient for good shots. This means a pattern of 140 to 150 at 40 yards with the right barrel, and 200 to 210 with the left. The patterns of the first barrel at 30 yards, and that of the second at 40 yards, when compared with each other, will be about the same, both with regard to spread and number of pellets in the 30-inch circle.

The difference between the size of the killing circle of the right and left barrel at 25 yards would be very little, both being about 24 inches, but at 20 yards the cylinder would have killing circle 2 to 3 inches larger.

With the old, or true cylinder, at 20 yards the spread would be larger and the pattern patchy and irregular, so that a bird might sometimes escape when within a few inches of the centre of the charge. At all distances these patterns are very irregular, sometimes shooting so wildly that they do not put 30 pellets on the target.

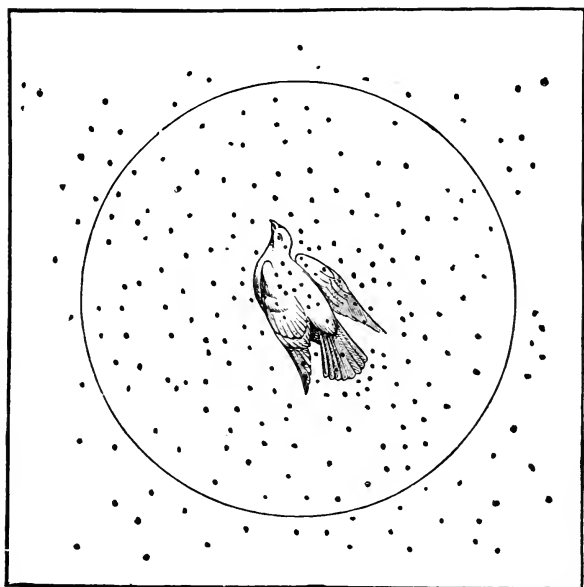
It has been stated by some writers in favour of cylinders that they will give a greater killing circle than 30 inches.

The author never saw the cylinder that could be relied upon to do it. The pattern outside the

30-inch circle is so thin and patchy that it cannot be expected to kill.

Excellent shots may have the range extended ten yards, if possible, and indifferent shots the range reduced ten yards. It is the ability of the shooter to aim the gun which will determine the amount of choke. The fullest choke-bore will not "riddle" a partridge at twenty-five yards, but as the spread of the shot at that distance will be smaller than the killing circle of the gun at forty yards, a true aim must be taken. It is easier to correctly align a gun at twenty than at forty yards, and the indifferent shot, whose poor shooting arises from the inability to aim, should avoid long shots. The poor shot who misses from nervousness should try long shots. A very little practice will give much more knowledge on the subject of a suitable choke than any number of instructions.

There is but one cylinder. It is useless to expect patterns, penetration, and velocity from a cylinder-barrel which are beyond the capabilities of the cylinder-bore, and go to whomsoever you may, if you want closer patterns, greater penetration, or more uniform shooting, he must "improve" the cylinder by choking to give you what you want. For a trap-gun a full choke is absolutely necessary. For a game-gun the pattern may be reduced, but it is rarely advisable to purchase a gun which will not make an average pattern of at least 140 with either barrel, which is in reality a modified choke. The



Facsimile.—Circle, 30 in. diameter, Plate 4 foot.

Number of pellets in circle, 250. Killing circle, 35. This diagram represents the shooting of a pigeon-gun, 12-bore, with 4 drams and  $1\frac{1}{4}$  oz. No. 6 shot.

choke can always be so loaded as to equal the cylinder in wideness and regularity of spread, but no gun-maker, or sportsman, can load a cylinder to shoot as closely and evenly as the choke.

Any number of instances might be cited which illustrate the immense superiority of the choke-bore. For all-round game-shooting there is certainly nothing to equal it, and as a trap-gun it is invariably used. The choke has no disadvantage. It may be too close in its shooting for certain game at short ranges, but this is a fault at once remedied by having a special load for the choke-gun when a large spread at short range is required. It must, however, be remembered that a cylinder-bore gun at fifteen yards range has put fifty-four pellets of No. 6 into a pigeon, and that a choke at twenty yards will not average more than forty, even if "dead on" each shot. The choke may be used for wild-fowling for rough shooting, and it will, in many instances, enable the good shot to secure game, where he would, if restricted to the cylinder, have no chance whatever.

*Extract from THE FIELD, February 10th,*  
1894.

"SIR,—Will you allow me to give my experience with guns? I shot for many years with a first-rate cylinder gun by Dougall. Soon after choke-bores appeared I had one built for me by Mr. Greener. The pattern of each barrel after I

had used it for five years was 220 with  $1\frac{1}{8}$  oz. No. 6, but I use No. 5 all the season. I handed the Dougall over to my son, and shot exclusively with the choke. My shooting improved, as it will with any man who is in the habit of killing game with the central portion of the charge. As to smashing game, I cut out of cardboard a number of shapes representing the body of a partridge, and fired at them at 25 yards with the choke and cylinder alternately; on the average, the choke put five more pellets into the bird than the cylinder did. There is much nonsense about smashing birds with choke-bores. Any decent gun will pretty well plaster game at ranges up to 25 yards, within which range a large portion of the bag is made.—F. M. E.”

Another correspondent to the same journal the following week says:—

“No sporting gun, *i.e.*, up to 12-bore, with the usual sporting loads, will make certain of killing a partridge every time, ‘end on’ or broadside, at 40 yards. First, it is a good gun which will average much over 200 in a 30-inch circle at 40 yards. Now, assuming the area of a partridge, ‘end on,’ to be equal to a 3-inch circle, then a 30-inch circle is equal to 100 partridges; and it follows from this that a gun giving an evenly distributed pattern of 200 at 40 yards, will average two pellets on each three inches, or two per bird.”

## HOW TO LOAD A GUN.

The standard loads of guns for various gauges have already been given in this chapter. The sportsman must, however, remember that the closeness of a gun's shooting may generally be improved by the use of Schultze gunpowder, if the gun is full or modified choke. The No. 4 black powder is that usually best suited to guns from four to twenty-eight gauge.

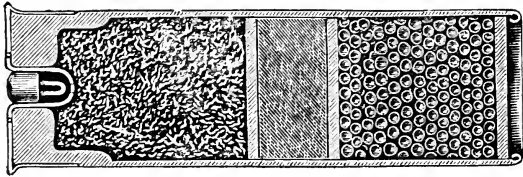
As to the size of shot, No. 6 of 270 to the ounce is the standard for 12-bores, in which also every size may be used.

The 28-bore will do relatively better with eight or seven than with six or five, and with a 4-bore gun anything smaller than No. 3 is wasted.

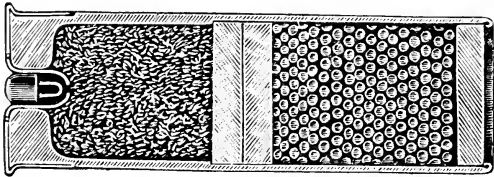
Modified choke-bores and cylinders give a larger killing circle the smaller the shot. 20, 16, and 12-bore cylinder barrels may be used at the ordinary winged game of Great Britain with greater success if charged with No. 7 than with 5 or 6. In 12-bore guns it is not wise to load with larger shot than No. 4, unless the gun has been regulated for use with a certain size of large shot. For 10-bores No. 1 size is the limit. These remarks must not be construed to mean that the 12-bore game-gun must always be used with one size of shot ; for quail and young partridge shooting No. 7 may be employed to advantage, and for shore shooting even larger size than No. 4. But the sportsman must remember

that when he uses the large shot he is sacrificing closeness of shooting for the extra benefit he obtains from the increased range and smashing power of the large shot. Cartridges loaded with nitro-compounds must be well turned down.

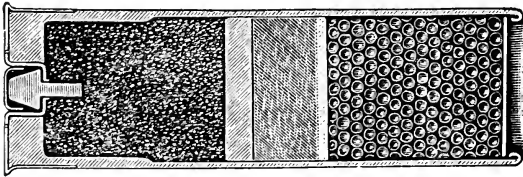
Good close shooting in guns of any bore can only be obtained by using cartridges loaded rationally, and to be rationally loaded there must be good wadding between the powder and the shot. The secret of good shooting is in the employment of a first-class felt wad over the powder; and it is imperative that this wad be of good quality. The texture must be close and firm, but the relative hardness or softness of the wad is of less moment. It should be of the same diameter as the internal diameter of the cartridge-case in which it is to be used— $\frac{3}{8}$  or  $\frac{7}{16}$  thick for 12-bores, thinner for smaller bores, and thicker for larger bores. To protect the *powder* from the injurious effect which may result from continuous contact with the chemically-prepared felt wad, a thin card wad or a waterproof wad should first be inserted; and it is supposed to be conducive to closer shooting if this protective wad, instead of being a simple card wad, be a compound paper and felt wad—technically known as the “pink-edged” or “FIELD” wad. This “Field” wad should always be used when loading with nitro-compounds; with black powders its use is not so imperative. It is customary to place a third wad, of thin card, between the thick felt wad and



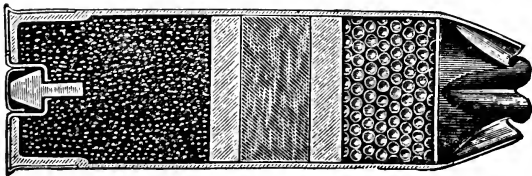
Cartridge Loaded for Close Shooting with Black Powder.



Cartridge Loaded to Scatter.



Cartridge Loaded for Close Shooting with a Nitro-compound.



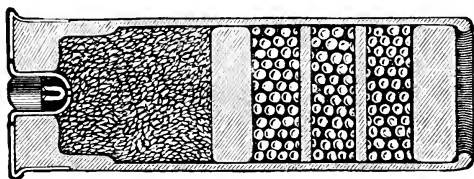
Brass Cartridge Case Wadded for Close Shooting.



shot, but it is very doubtful if any benefit will accrue from its use.

The cartridge loaded for close shooting will, therefore, be charged, as in the illustration on opposite page.

Heavy charges of powder are a mistake. Using larger charges in a 12-bore than  $3\frac{1}{2}$  drams, or the equivalent in nitro-powders, no matter what weight



Cartridge Loaded to Scatter the Shot.

the gun is, only scatters the charge, and spoils the regular shooting of the gun.

The widest spread at the shortest range is obtained by using a recently patented wad, which divides the load of shot longitudinally, ensuring this by its cruciform structure, the pellets being contained in four equal compartments between the wad and the inside wall of the cartridge case. With this wad the pellets from a 12-bore full choke were spread over a 30-inch circle at 15 yards. With a wad dividing the shot in the same manner, but in three equal divisions, the spread is almost as great.

Loading with two pink-edge wads over the

powder, and one pink edge wad over the shot, as is often done in the United States, causes the charge to scatter, and such loading will lower the pattern 15 per cent. in a gun fully choke-bored.

If charged with "Schultze" or "E.C." gunpowder the wads used will be the pink-edged or "Field," the thick felt and the thin card as shown.

If brass cases are to be loaded for close shooting, put the wads, as illustrated, between the powder and shot, and crimp the case.

When loading long 12-bore cartridge-cases,  $2\frac{7}{8}$  or 3 inches, with large charges of powder, two thick felt wads (soft and elastic) should be placed over the powder, and a thin card over shot, to obtain the closest and most regular pattern.

To load choke-bore guns so as to scatter the shot at close quarters diminish the thickness of wadding between the powder and shot, and increase it over the shot. This is pretty effective, but the best plan is to load as illustrated.

The charge of shot, it will be seen, is separated by two cardboard wads. This will cause a full-choke-bore gun to make a pattern of 140 at 40 yards instead of 220. A still smaller pattern may be obtained by using one ounce of shot instead of the ounce and eighth, and still further by substituting No. 5 for No. 6 shot. If it scatters too much, separate the shot by one wad instead of two.

or by simply using one pink-edged wad only over the powder, and one over the shot.

The scatter-charge has good penetration at 30 or 40 yards, but of course not so much as when loaded for close shooting.

For rabbit shooting, with a full-choke-bore gun, at 15 and 20 yards distance, very successful results have been gained by reducing the charge of shot to  $\frac{1}{2}$  oz., the smashing of the game being thus avoided.

There is an idea prevalent that by diminishing the charge of powder below the standard charge, and keeping the standard charge of shot, the closeness of the pattern will be increased. This is erroneous, so far as it applies to guns choke-bored, and the use of black gunpowders, and in any case it is productive of irregular shooting and patchy patterns.

By overloading the gun with powder and shot, or with powder only, irregular patchy and open patterns are produced.

When small charges are used the cartridges should not be shortened by cutting down or turning over beyond the usual limit, but by filling the space with wadding—or the case may be slightly turned down, and then crimped, as are the thin brass cases.

It will be found to be true economy to purchase just such cartridges as are required for the sport purposed than to use unsuitable loads. For

partridge shooting use the *Sporting Life* cartridges; they are also suitable for grouse shooting, and may be looked upon as amongst the best for all-round purposes. For shooting in pigeon matches and at wild fowl use the very best cartridges procurable, and by no means employ reloaded cases.

For rabbit shooting a cheap cartridge may be purchased, but such cartridges should not be stored. It is economical to work up old, damaged, mixed or suspected cartridges at a rabbit shoot.

#### SELECTING BUCKSHOT.

To select a buckshot which will suit a particular gun, put a wad in the muzzle of the gun about  $\frac{1}{2}$  an inch down, and fit the shot in perfect layers. There will be no need to try them in the cartridge cases, as it is immaterial how they fit there. Buckshot of a size which will average 9 pellets to the  $1\frac{1}{8}$  oz. will generally fit a full choke-bored 12-gauge gun, the three shot to the layer. If a smaller shot be required choose four or five to the layer, avoiding sizes which do not fit fairly well; with such well-chosen buckshot nearly the whole of the 9, 12, 16 or 20 shot of the charge will be in a circle of about 30 inches diameter at 40 yards range, if the gun is of good quality and properly bored (*see* page 47).

#### SHOT-GUNS AS BALL-GUNS.

It is well known that the ordinary double-

barrelled cylinder shot-gun will shoot spherical bullets with fair accuracy up to fifty yards.

The recoil felt by firing a light 12-bore gun with a spherical bullet is very considerable; as a matter of fact the recoil is 13 lbs. heavier with the bullet and the standard charge of powder than with the standard charge of shot.

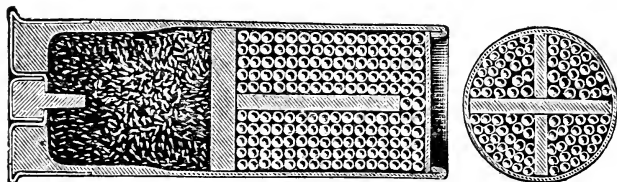
Choke-bore guns may be used as ball-guns, providing that the bullet to be fired will pass easily through the muzzle; and it may be interesting to sportsmen to know that choke-bore guns shoot ball *quite as well* as guns bored perfectly cylinder. Especially is this of interest to those who use but one gun, and have often the chance of a shot or two at big game. Gun-makers and sportsmen alike have been misled by the proof marks; formerly, on all choke-bores "Not for Ball" was imprinted.

Another point to be noticed is that when one barrel be modified choke or cylinder it is only necessary to use the one-sized ball, the larger bored barrel shooting, to all intents and purposes, as well as the barrel for which the ball is moulded.

Any gun which is safe to use with shot is quite as safe with ball, provided that ordinary care be taken to see that the ball be not larger than the smallest part of the barrel, and the charge of powder does not exceed  $2\frac{1}{2}$  drms. of powder No. 4, or No. 6, black, for light guns, and  $2\frac{3}{4}$  to 3 drms. for heavier than 7 lbs. One card and one thick felt

over the powder, the ball being fixed in either by an ordinary turnover or crimper, will give all that is desired. *Neither wad nor patch over the ball.*

Bullets cast in a 14-bore mould will invariably suit a full choke, and 13 bore for cylinders.



Winans & Sinnock, Patent Shot Spreaders.

The above illustration of the shot spreader is the latest and best of its kind the author has seen. A full-choked gun may be made to shoot far more openly than any cylinder by its use, and at a short range of even 10 yards a good spread results. The only wads required in loading are a pink edge next the powder, the spreader and a thin card over the shot. The author has tried it considerably, and has every confidence in recommending it to sportsmen who use a full-choked gun, and who at times require to shoot at short distances. These wads may be obtained from W. W. Greener, London and Birmingham.

## CHAPTER VI.

A MISCELLANEOUS CHAPTER—GUNPOWDERS—  
NITRO-EXPLOSIVES—SHOT—CARTRIDGE-CASES  
—LOADED CARTRIDGES—GUN-CASES, ETC.  
ETC.

## GUNPOWDERS.

THE explosive used in shot guns is either black gunpowder (saltpetre, charcoal, sulphur) or a nitro-compound (carbon base, treated with nitric and sulphuric acids). The black gunpowder is granulated, the grains being of various sizes, ranging from dust to  $1\frac{1}{2}$ -inch cubes for use in cannon.

The ingredients of best black gunpowder are in the following proportions: saltpetre 75 per cent., charcoal 15 per cent., sulphur 10 per cent.—and this is the proportion generally followed by English and the best foreign makers.

The explosive force is generated by the saltpetre and charcoal; the sulphur raises the temperature of the freed gases, and adds to their volume by its own decomposition. The speed with which a charge of powder explodes is due to the size and density of grain. This question of grain is of the first importance to the sportsman.

No. 4 is unequalled for all-round shooting in

guns of any gauge. For 12 and smaller bores, when strong shooting is required, the No. 4 Alliance, having a larger proportion of the finer grains than is usually found in ordinary No. 4, will be found to give satisfactory results. This powder would not be obtained by mixing No. 3 and No. 4 together in *any* proportions, but would require to be specially sifted.

To sum up the question of grain in one sentence: whilst No. 6 gives regular and even patterns, it has not the velocity of smaller grained powders; the



No. 4 Alliance Powder.

Nos. 3, 2, and 5 grained "Basket" cause the pellets to scatter more rapidly than the larger grained powders; the No. 4, therefore, is the happy medium for the ordinary purposes of the field and trap shooter.

The best gunpowder requires the very best alder-wood or dog-wood charcoal, refined sulphur, and the purest saltpetre. These three ingredients must be *thoroughly* corporated, and the powder submitted to great hydraulic pressure, before being broken up and granulated.

The charcoal of inferior quality, or badly burnt



or of the wrong wood, will spoil the quality of the powder, whatever pains be taken with the subsequent stages of manufacture.

The brown, or cocoa powders, recently introduced, owe their colour to a different treatment of the charcoal, and these powders have no special quality to recommend them for sporting purposes.

#### TO TEST THE QUALITY OF GUNPOWDER.

Rub a few grains in the palm of the hand, or between the finger and thumb. If it is reduced to dust with little pressure, its density is insufficient, and the quality poor; if the colour of the dust is of inky blackness, the charcoal is of inferior quality, and the powder poor in consequence. Good gunpowder can scarcely be reduced to dust by rubbing in the hand; the dust will be of a rich dark brown, and if a little powder be ignited in a piece of paper, no residuum should be left, nor the paper burnt through.

These rough and ready tests are not of course equal to trying the powder in a gun of known quality or to laboratory tests, for flashing point which should be  $600^{\circ}$  F., etc.

The chief nitro-explosives are the "Schultze," "E. C." and the "S. S." or Smokeless; they are made by impregnating some carbon basis, cotton or wood pulp, with nitric acid and purifying them by chemical means. "Schultze" is the oldest and best known; it is made from pulped wood which, after nitrification and purification, is granulated and

waterproofed; "E. C." is granulated gun cotton waterproofed and treated in a special manner. The "S. S." of the Smokeless Company is a chemically prepared powder, and the Company manufacture other powders of a quite different nature for rifles.

Nitro-powders possess various advantages over black, the chief being the absence of smoke after the discharge, and the small amount of residue deposited in the barrel. This is on account of the greater percentage of available gases contained in nitro-compounds to that of gunpowder. Black gunpowders usually give about 65 per cent. solid residue and 35 per cent. available gases, which, of course, have to drive out of the barrel the solid residue, in addition to the charge of shot and wads in front of it, the major portion of the solids being in a state of fine division or smoke. The best wood powder will give about 30 per cent. solid residue, 70 per cent. available gases; consequently, one-half the charge of powder by weight is equivalent in force to a full charge of black powder. This leaves, therefore, only about 15 per cent. solid residue to be expelled from the barrel, against nearly 65 parts solids from black. The solids resulting from the wood powder are expelled in a coherent form instead of smoke, thus slightly lessening the recoil.

Unconfined wood powder, in common with other nitro-compounds, may be ignited without

obtaining a third of the available explosive force; to get the best results the ignition must be made by a detonator. The detonating powder contained in the ordinary sporting cap is sufficient for a sporting charge.

Black gunpowder, on an average, will fire at a temperature of  $539^{\circ}$  Fahr., whilst nitro-cellulose or "E. C." and Schultze powders fire at  $370^{\circ}$ , and should they be heated will require less detonation.

The strength of nitro-compounds generally is better developed when the detonator is in actual contact with the explosive. The flash alone of an explosive cap would not develop nearly so much energy from the powder as would a detonator fired in the middle of the charge; but the explosion would be stronger than if the charge were fired by insertion of a heated wire, or by the application of a flame.

All nitro-compounds are more violent in their action the more tightly they are confined and the stronger the detonation by which they are exploded.

The pleasure of shooting is so greatly increased by the use of these smokeless powders that they are rapidly superseding black gunpowders for all sporting purposes. Powders so carefully made as the "Schultze" may be relied upon as safe to use, provided not more than usual sporting charges are employed. An increased load of shot permits of

greatly increased explosive force being developed by chemical powders in the chamber of the gun, and consequently it is important to adhere to those proportions of powder and lead which have been found generally suitable for the guns of various calibres.

In large-bore guns and when large charges of shot are used, the use of black powder is recommended, as it is far safer than nitro-compounds.

Avoid fine grain powder, as it is likely to burst the barrel on account of its quick ignition; this applies even more especially to rifles. Never use nitro-powders in rifles unless it is made specially for rifles and so marked.

Powders of the chemical class, other than those above cited, must be used with great care; unless the sportsman has actual proof that they are absolutely safe in guns of usual strength, the risk will always be somewhat greater than that which follows the use of black.

This applies more especially to nitro-compounds of foreign manufacture, many of which develop an increased internal pressure which renders them unfit for use in light guns.

#### BURSTING STRAIN OF GUN BARRELS.

The translation into figures of results obtained by experiment with the Crusher Gauge to determine the internal pressures developed in gun-barrels by

the different powders, has, up to the present time, been unsatisfactory.

Each expert adopts a different formula of calculation, with the result that the figures cannot be compared with those of another.

The machine known as the Crusher Gauge is a scientifically-constructed instrument so designed to register, by the reduction of leaden plugs, the pressures exerted at various points in the barrel. The results obtained are comparative only, the "tons per square inch" are deduced from the amount of crushing of the leaden plugs, all of which must be exactly the same size and of the same specific gravity.

According to the author's calculations, the normal pressures developed by No. 4 black powder are about 2 tons to the square inch at 1 inch from the breech, 1'90 tons at  $2\frac{3}{4}$  inches, and  $\frac{1}{2}$  ton at 6 inches.

With Schultze and E. C. powders in the normal state, and containing the same percentage of moisture as when leaving the powder mills, the pressures are about equal to that of black. The pressures are greatly increased with both these powders by quickly drying them at a heat of  $212^{\circ}$ , and still more so when the process of over-drying is long continued and slow. This being so, nitro-powders should be used with great caution in hot, dry climates.

It is also advisable to follow carefully the

instructions for loading generally printed on the canister, more especially as new powders are being introduced into the market, some of which are of less bulk than the older established powders, and with which it is possible to overload to a dangerous extent.

In guns of smaller bore the proportionate pressure per square inch is greater than that upon 12-bores with the same charge of powder. This being so, it is advisable to take extra precaution in loading the cartridges for these small bores.

#### SHOT.

Lead shot is of two kinds: that which is moulded, as large buckshot, and that which is "dropped," as the ordinary small shot.

Drop shot should be made of lead without a tin alloy; it may be hardened by the patented process of the Newcastle Chilled Shot Company. Hard shot is preferable to soft for all purposes, but it is more expensive. The hardest, heaviest, and roundest shot made in the world is that manufactured at Gateshead by the Newcastle Chilled Shot Company. The hardest lead shot will not injure a gun-barrel, even if the barrel be of soft Belgian metal.

It is well known that sometimes several shots of a charge will take an erratic flight, but it has been fully proven that chilled shot is less prone to thus fly off at a tangent than soft shot, and this whether

the gun used be choke-bored or cylinder. Therefore it is much safer to use.

The nearer to a perfect sphere each pellet of a charge is when the charge leaves the muzzle, the nearer perfect will be the flight of that charge. In passing through the barrel the shot, by pressing against one another and the barrel, become deformed unless they are of hardened metal. Chilled shot will improve the shooting of any gun ; it does not lead so much as the softer shot, and if made as it is by the Newcastle Chilled Shot Company is of the same specific gravity and free from poison as soft shot, whilst as a projectile it is superior in every way.

American and Continental shot is not so regular either in size or shape as the best English shot, and as there is no recognised standard gauge, and instead of testing what a gun will do with No. 5 or No. 6 of a particular make, it will be better to give it as the number of shots to the ounce as 270, 218, 450, etc.

No. 6 shot of different makes as sold in England will vary as much as 100 pellets to the ounce, so it may readily be seen that unless a person knows the exact number of pellets to the ounce of shot he is using he could easily be deceived as to the gun performance at a target.

The following are the sizes sold by different makers ; but, except in one or two cases, these figures are not strictly adhered to by the makers themselves :--

## STANDARD SIZES OF ENGLISH SHOT.

LANE AND NESHAM, LONDON.		NEWCASTLE CHILLED SHOT CO., GATESHEAD-ON-TYNE.	
Size.	No. of Pellets to the Ounce.	Size.	No. of Pellets to the Ounce.
A A A A	30	A A A	40
A A A	35 to 40	A A	48
A A	40	A	55
A	45	B B B B	56
B B B	50	B B B	64
B B	58	B B	76
B	75	B	88
1	80	1	104
2	112 to 120	2	122
3	135	3	140
4	175 to 180	4	172
5	218 to 225	5	218
6	278 to 290	6	270
7	340	6*	300
8	462	7	340
9	568	8	450
10	985	9	580
Dust	1672	10	850
*S G	11	11	1040
*S S G	15	12	1250
*S S S G	17	Large Dust.	1700
*L G	5½	Small Dust.	2800
M G	9	S G	8
—	—	S S G	11
—	—	S S S G	14

\* Walker, Parker, & Co. London sizes.

## CARTRIDGE-CASES.

The cartridge used to-day is still the same in principle as Mr. Daw introduced over thirty years ago, the sizes being identical. The ordinary 12-bore cartridge case is correctly  $2\frac{9}{16}$  in. long, but much confusion results from this case being called



SIZES OF AMERICAN DROP SHOT.

T. N. SPARKS, Philadelphia.		TATHAM BROS., New York.		N. Y. LEAD Co., New York.		LE ROY CO., New York.		ST. L. SHOT Co., St. Louis, Mo.		SELBY CO., San Fran- cisco.		CHICAGO CO., Chicago, Ill.		MERCHANTS' Co., Baltimore.		DUBUQUE Co., Dubuque, Iowa.	
Size.	Pellets.	Size.	Pellets.	Size.	Pellets.	Size.	Pellets.	Size.	Pellets.	Size.	Pellets.	Size.	Pellets.	Size.	Pellets.	Size.	Pellets.
F	22	FF	24	—	—	TTT	24	000	29	—	—	—	—	TTT	22	—	—
T	36	F	27	—	—	TTT	27	00	32	—	—	000	27	TTT	26	000	27
T	41	VY	31	TT	32	TT	32	0	40	—	—	00	33	TT	30	00	33
BBB	48	T	38	T	38	T	38	BBB	46	—	—	0	38	T	34	0	38
BB	55	BBB	42	BBB	44	BBB	44	BB	53	BBB	46	BBB	46	BBB	39	BBB	46
B	63	BB	49	BB	49	BB	49	B	63	BB	55	BB	53	BB	45	BB	53
I	80	B	59	B	58	B	58	—	—	B	68	B	62	B	52	B	62
2	90	I	71	I	69	I	69	—	79	I	79	I	75	I	60	I	75
3	118	2	86	2	82	2	82	2	98	2	89	2	92	2	77	2	92
4	130	3	106	3	98	3	98	3	116	3	118	3	118	3	94	3	118
5	182	4	132	4	121	4	121	4	163	4	134	4	146	4	115	4	146
6	245	5	168	5	149	5	166	5	181	5	170	5	172	5	140	5	172
7	305	6	218	6	209	6	209	6	252	6	215	6	246	6	180	6	246
8	426	7	291	7	278	7	278	7	306	7	303	7	323	7	225	7	323
9	615	8	399	8	375	8	375	8	426	8	420	8	434	8	365	8	434
10	950	9	568	9	560	9	560	9	584	9	592	9	596	9	610	9	596
11	1660	10	848	10	822	10	822	10	981	10	874	10	854	10	1130	10	854
12	3316	11	1346	11	982	11	982	11	1003	11	1404	11	1414	11	2200	11	1414
Dust	5910	12	2325	12	1778	12	1778	12	2305	12	2030	12	2400	12	3200	12	2400
—	—	—	—	—	—	—	—	—	—	—	—	—	—	13	12200	—	—

sometimes  $2\frac{5}{8}$  in. and sometimes  $2\frac{1}{2}$  in. Other sizes, from 10 to 20-bore, are made this same length.

There is some difference in the shape of the anvil. All the best English and Continental makers adopt the plan of a movable anvil, but American makers use caps, which fit upon an anvil formed in the base of the cartridge-case, or a small anvil is used which is contained within the cap. The metal of American caps is thinner and softer than that used in England, the object being to have a more sensitive and easily-exploded cap. The drawback to this is that the striker frequently perforates the cap, and a large escape of gas results, and occasionally a dangerous escape, sometimes splitting the stocks of hammerless guns and blowing out the strikers of hammer guns.

Very fine cartridge-cases, as the "Ejector" case of Messrs. Eley Bros., and "The Grouse" case of Messrs. Kynoch, are covered with thin brass nearly the whole length of the case, following a principle adopted some dozen or more years ago by M. Bachman in the "High Life" case; for wet weather they are perfect.

The chief requisites in cartridge-cases for shot-guns are: perfect ignition, uniformity of size, capability of resisting atmospheric changes, and moderate pressure.

Nothing is more tantalising to the sportsman than miss-fires; hang-fires, too, are a great nuisance. To enjoy shooting there must be perfect

freedom from tight-fitting cartridge-cases, and the cases must be well made to stand heavy charges and extract freely. Not unfrequently with cheap cases the heads are pulled off by the extractor, the cylinder being left in the chamber to be removed by the *grip extractor*, sold by gun-makers for this purpose, or cut out with the shooter's knife.

The cases must be of exact size also in the rim; many have small rims, so that in loading they may be pushed past the extractor, if force is used. Care should be taken not to do this; if the cartridge is put against the extractor and the gun closed, after the cartridge is fired the base will expand, and it will extract properly. It is also of importance that the case be substantially made, capable of resisting such pressure as careless packing in the magazine, or the usual accidents of travel may occasion. A stout well-made case will keep the powder in better condition than will a thin unglazed imperfectly-finished one.

Good cases are made by all the leading makers. Since the introduction of nitro-compounds distinctive colours are used, and the old line of colour as denoting quality is not so strictly observed. The brown colour is still used for cheap cases.

For perfect ignition, few makers equal, and none surpass, the best cases of Messrs. Eley Bros.; the average of miss-fires through faulty caps is in their best cases only a small fraction of 1 per cent.

Their new case for nitro-compounds has a metallic capsule covering outside the paper like the old "High Life" cases, common on the Continent a dozen years ago.

The thin brass perfect case of Messrs. Kynoch has greater capacity than the paper cases of the same nominal gauge. These cases do not swell, and keep the powder in good condition. They are much favoured by some sportsmen; others do not like the "feel" of the sharp edges of the metallic cases, and continue to use paper. The latest pattern of perfect case has the base filled with paper pulp, which strengthens the rim, renders the base solid, and lessens the liability to miss-fire. These cases do not give way in the least; and if the primers are kept of uniform good quality, sportsmen may congratulate themselves upon having a truly "perfect" case. In America good paper cases, or "shells," are dearer than in England, and not equal in quality to those made here. The American metallic cases are good, but very dear. On the Continent a very cheap paper case—colour greyish-brown—is sold, which is of such poor quality that all sportsmen would do well to avoid using them.

#### IGNITION.

Different makes of cartridge-cases, being furnished with different caps, are not alike in the method of ignition, of the explosion, nor in the time occupied in igniting the powder.

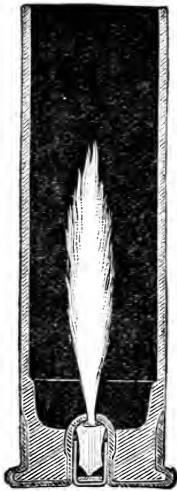
The time actually passed between the pulling of the trigger of a good C. F. 12-bore gun and the exit of the shot from the muzzle of the gun should not exceed  $\cdot 0075$  of a second ; with the " Life " cases this is reduced to  $\cdot 0065$  of a second, and if quick powder, as " basket " or No. 3, is used, it is again reduced to  $\cdot 0060$  of a second or less. With smaller bores the time is less. When the time taken is  $\cdot 03$  of a second or more, a " hang fire " is perceptible ; when  $\cdot 06$  of a second, a click is heard between the pulling of the trigger and the report.

The original *Sporting Life* cartridge, introduced by the author some years ago, had a stronger cap, with respect to the quality and amount of fulminate used, than the other cartridges in use, and was the only cartridge perfectly adapted for nitro explosives.

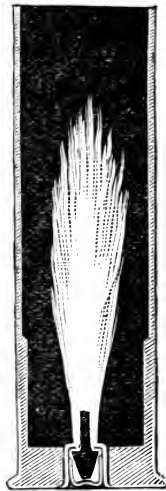
The cartridge-makers now supply cases with strong caps, which offer similar advantages.

The difference in the form of anvil and the ignitions of the caps may be estimated from the accompanying illustrations.

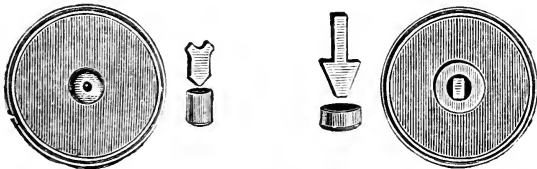
The *Sporting Life* cases have given every satisfaction, and have attained a high reputation for killing power ; many sportsmen will use no others, as they declare that they will kill game as no other cartridges can. These cases, when loaded with first quality powder, good wads, and chilled shot, make a cartridge far superior to any other in the market.



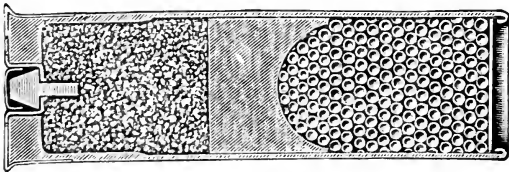
"Eley" Case.



Original *Sporting Life* Case.  
Ignition of Central-fire Cases.



View of the Cap-chambers and Section of Caps and Anvils of the *Sporting Life* and "Eley" Cases.

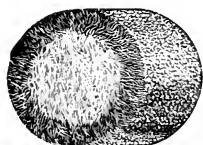


Greener's pattern Swedish Cup Wad.

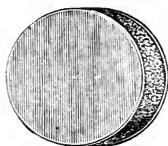
Many Guns have been found to shoot better by using the above Wad.

## WADDING.

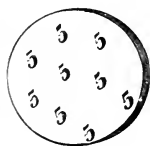
The wadding used in the shot-gun is of three varieties : 1st, the simple cardboard wad ; 2nd, a felt wad ; 3rd, a hard felt paper-faced wad, known



Felt Wad.



Field Wad



Shot Wad.

as the "pink edge" or the Field wad. A cardboard or waterproof (pitch paper) wad must be placed over the powder ; this must be followed by a lubricating felt wad, usually  $\frac{3}{8}$ ths of an inch in thickness. The top wad over the shot must be of the thinnest cardboard. Pink-edged, pink-faced, "Field," and thick cardboard wads, cloth wads, and black wads, are used for special purposes, as specified in the section on cartridge loading.

The best felt wads are elastic, of a light pink colour, deeper at the greased edge. Cheaper qualities are of a deeper tint, and the commonest are brown in colour and not close in texture. The "Field" wad is black (pitched paper) on one face, pink paper on the other ; the edge is greased. Pink-edged wads are greased at the edge, and have paper faces of a light pink tint ; they should be of elastic felt.

Numerous wads have been invented to act as

concentrators in confining the charge of shot in its flight, but for the most part they act but imperfectly even with cylinder guns, and are quite useless with choke-bores. Wads of hard brittle material, which will crumble to dust when the gun is fired, are sometimes used over shot, though the thin card wad is still employed generally.

Felt wadding *must* be used between the powder and shot, a wad  $\frac{3}{16}$  inch thick is enough for a 28-bore, and  $\frac{3}{4}$  inch would not be too thick for an 8-bore; as there is not a wad so thick, a pink-edged wad must be used as well;  $\frac{3}{8}$  or  $\frac{9}{16}$  is the correct thickness for a 12-bore wad.

Wads need not fit the case tightly. There is little doubt but that the wads are expanded in the cartridge case before the shot is started. The felt wad serves to clean the fouling in the barrel left from the firing of the previous charge. The blackened edges of the felt wad are not caused by the gases of the ignited explosive singeing the wad, but the fouling in the barrel, which fouling also hardens the wad edge very materially. It is quite possible that this fouling is in some way beneficial to the gun barrel, as it acts as a lubricant for the shot, and it is well known that a shot barrel with a certain amount of fouling will throw the shot closer and harder than a dry, bright barrel.

#### TO LOAD CARTRIDGES.

To load quickly and accurately, place the cases



to be loaded base down upon the table. Adjust the powder measure, put the powder into a basin, take up a full measure, strike it off level with the base of the case to be loaded, and pour it in the case carefully, holding the case over the basin. Having filled all the cases with powder, put in the first wad and press it squarely and firmly down ; the succeeding powder wads may then be put in and rammed home together. The shot must be poured in through a tundish, and preferably counted with the "Greener Shot Counter," or weighed to measure, the top wad of thinnest card, and not too tight, the turning over firmly and evenly done.

Cartridge-cases do not pay to reload ; it is false economy in England to reload paper cases or perfects—abroad it may be necessary to do so occasionally, but no case fires so well a second time. Paper and brass cases both quickly lose their elasticity if reloaded and fired time after time, and in reloaded cases there will always be a greater percentage of miss-fires than in new ones. The de-capping must be done as soon after firing as convenient. New anvils will be required to some cases ; and care must be taken that the cap and the anvil are both got well "home" in the cap chamber when re-capping, or miss-fires will certainly ensue.

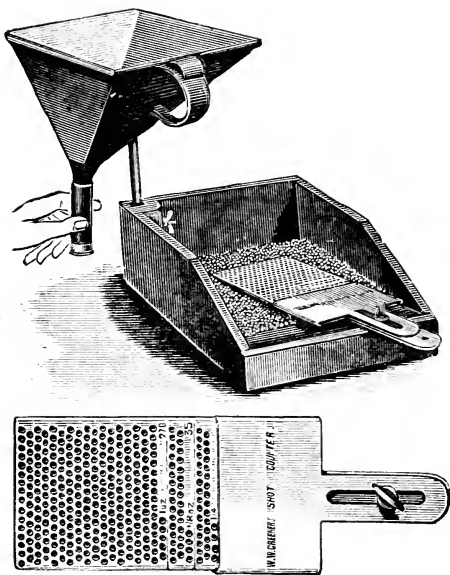
Paper cartridges and brass may be kept over from one season to another without appreciable

deterioration, provided they are stored in a dry, airy place, and at equable temperature of 50°. Powder, whether black, Schultze, or "E. C.," that has once become damp or sodden, can never be dried so as to recover its original strength. There can be no doubt that in hot, dry climates nitropowders increase in strength and develop higher internal pressures; for such countries moderate loads are the best and safest. It must not be supposed that the powder in damp cartridges can be dried without unloading the cartridges; to attempt to do so would be like trying to dry one's stockings without taking off one's wet boots.

#### THE "GREENER" SHOT COUNTER.

Further particulars of the "Greener" Shot Counter" have been so frequently demanded, that the adjoined illustration and description of this simple contrivance will doubtless be welcomed by those cartridge-loaders to whom the machine is still unknown.

By drilling holes of the requisite size and depth in a sheet of hard brass, a species of trowel is formed, in which the pellets of shot will stick when the trowel is forced into a mass of shot and slowly withdrawn. For the use of sportsmen a pattern is now made with a sliding cover, by which the number of holes exposed in the trowel may be varied, according to the charge of shot it is wished to load into the cartridge.



The Shot Counter, Shot Trough, and Tundish,

As already stated, the charge of shot is in this manner regulated by *number*—270 pellets of No. 6 weigh one ounce, 304 holes for 304 pellets are allowed for the  $1\frac{1}{8}$  oz., or standard charge, and beyond this charge the graduation may be varied with the greatest nicety.

In order to obtain exact results it is absolutely necessary that the *same number* of pellets are loaded into the cartridges; if the number varies—although the weight of the charge may not—there will be a variation in the pattern, which will probably prove misleading, and as it is easily avoided by using the counting trowel, the weighing of charges of shot should be discontinued.

The use of the trowel, with a plentiful supply of shot and the specially-made square—or ribbed—tundish, enables anyone to load cartridges accurately with great speed and ease, and it is a method far in advance of any system of weighing or measuring shot charges. A glance at the trowel as it is withdrawn filled from the shot-box will show whether any undersized or misshapen pellet is on the trowel, any irregularity in size, shape, or number of the pellets being instantly discernible, as each pellet occupies a separate cell and is seen distinctly.

The price, with box, tundish, and stand, is so trifling—viz., 21s.—that everyone who loads cartridges should give this method of loading a trial. It will be found satisfactory, and a properly-made

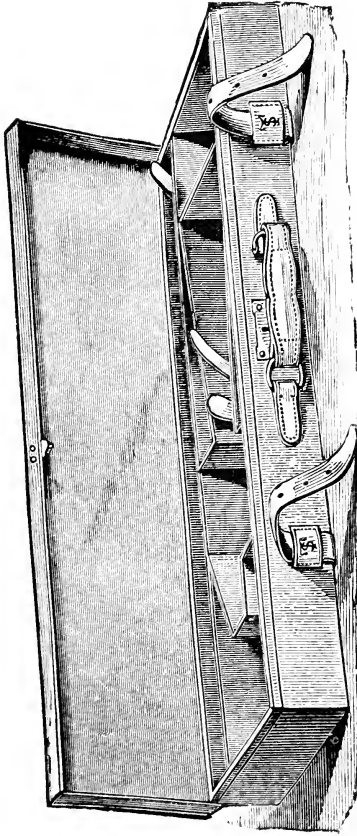
trowel will load millions of cartridges before the holes become so worn that it has to be discarded.

The author uses this counting trowel in loading all his cartridges, and has done so for many years. Sportsmen who do not load their own cartridges should see that the maker with whom they deal counts the pellets of the charge into the cartridges or states the number of pellets to the ounce used.

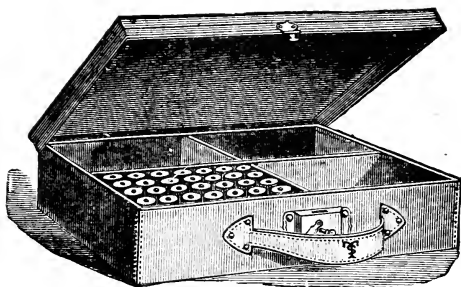
#### GUN-CASES AND IMPLEMENTS.

The gun that is worth owning is worth preserving. If kept in a gun-rack, or, better still, a dust-proof gun-cupboard, it will last longer, and if put away clean will always be ready for use. To take guns from place to place a case is necessary; if they are to be sent, a substantial oak case, leather-covered, is the best—such a case, well made, is worth about £5. It affords complete protection to the gun, and will itself withstand the roughest usage.

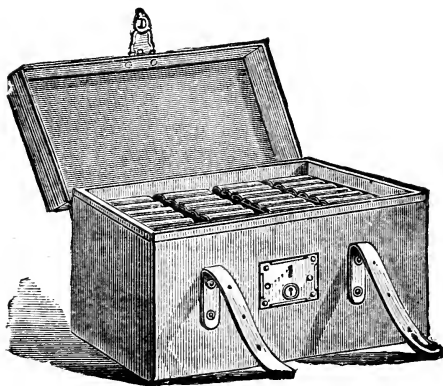
Sole-leather cases—that is to say, cases in which best leather is *sewn* to pine frames—are light and handy, and do well to carry guns in, but they must not be used as packing-cases; and although they will upon occasion stand several trips to the Rocky Mountains, they are not adapted to the rough usage they receive in the goods-van, and do not protect the gun as will the oak-covered case. A best sole-leather case is worth £4. The



The English Gun-Case.



American Cartridge Magazine.



English Cartridge Magazine.

leather leg-of-mutton case affected by trap shooters is very light, and serves well to carry the gun ; the cost is £2 to £3. Cheap soft canvas cases of the same shape are used largely in America, but they are not to be recommended, as the barrel is liable to injury and the trigger guard bent by coming in contact with each other. A case to carry the gun at full length has been recommended, but its bulk makes it inconvenient in many situations where the shorter case is no encumbrance.

It is preferable to carry cartridges in a separate magazine than in a tray in the gun-cases. These magazines are made to carry 50—the neat little case carried by the trap-shooter—and 100, 200, 300, 400, or 500, the last a substantial trunk, heavily made, and able to withstand luggage-porters' careless handling.

The divisions are preferable as in the English magazine, for the cartridges then travel better, and are more easily packed into and removed from the magazine.

The impedimenta in England may be restricted to a full set of cleaning implements, including pocket cleaner and chamber brushes, action brush, tow, rag, flannel, and oil. A pocket extractor is useful, and a pair of turnscrews may be kept in the cases.

Cartridge-loading apparatus will be found useless in England, where ammunition is cheap and it is not the rule to reload cases.



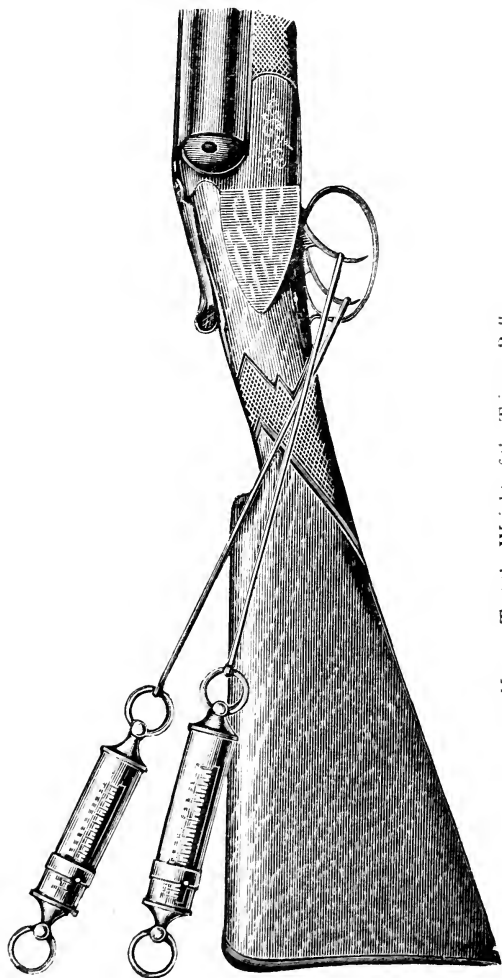
When travelling abroad, powder and shot measures should be taken, also a rammer and turn-over de- and re-capper.

Cartridges are best carried in a magazine of solid leather, or wood canvas covered. In the field cartridges may be carried in the pocket. Cartridge belts cannot be recommended for ordinary shooting, although there are times when they are very useful, if not indispensable. Cartridge bags to hold 75 or 100 cartridges are large enough for all purposes, and will be found to hang very heavily if much walking is done. Two small bags feel much lighter than one large one.

#### THE WEIGHT OF TRIGGER PULLS.

To test the weight of the trigger pulls it is necessary to pull them with the spring balance, each trigger at a different angle, as shown in the illustration.

When a spring balance is not procurable, a dead weight, such as shot in a small bag, attached to the trigger by a piece of string, and the gun held at the angle, as shown, will answer equally as well. It will be seen that the angle in the illustration of the spring balance is different for each trigger; if the balance were pulled straight back instead of at the shown angles, the pull would be much heavier, especially with the left trigger. As the angles given are similar to the action when pulling the trigger with the finger, it is necessary to know



How to Test the Weight of the Trigger Pull.

this when trying the pulls of guns; it is the way in which all gun-makers test the pulls of their guns.

The usual pull off for fine game and pigeon guns preferred by English sportsmen is 4 lbs. for the right and 5 lbs. for the left lock. Light 20-bore guns will do about 1 lb. lighter, but for heavy duck-guns and rifles the pulls must be heavier.

Some Continental sportsmen cannot use a gun which has a pull heavier than 3 lbs. for the first and 4 lbs. for the second barrel; the objection to such light pulls is, they are likely to jar off if the gun receives a slight blow, or even when closing the gun after loading, if it is done rather sharply, as it is sometimes.

The practice of slamming the gun up is dangerous, and young sportsmen should be very careful to close the gun after loading as gently as possible.

Some sportsmen prefer heavy pulls. Mr. Fulford, the pigeon shot, always has the pulls of both his triggers 10 lbs. This weight is the heaviest the author has ever made for the ordinary 12-bore gun.

Gentlemen abroad, when ordering guns, should state exactly what weight the trigger pulls are desired, so that the maker may regulate them properly. It very often happens that fine hammerless and ejector guns are spoiled by jobbing gunsmiths in attempting to alter the pulls; it would be far better to go on using the gun as it

comes from the maker, and get accustomed to the pull, than trust it with such men. The author has had several ejector guns returned from abroad which have been spoiled in this way.

It would be only a simple matter for the maker of the gun to alter the pull properly. The author considers that if a gun requires any alteration or repairs the maker of it is the proper person to do it, as he is more interested in seeing that it is done thoroughly.



## CHAPTER VII.

## THE GUN: HOW TO USE IT.

SHOULD a man carry a gun in such a manner as to endanger his companions he will be shunned by sportsmen generally, and quite deservedly.

Sportsmen who have been allowed the use of a gun from their boyhood generally make the best and most careful shots, therefore the earlier a boy is entrusted with a gun the more likely is he to make a safe shot. The boy who shoots, or is learning to shoot, is the one who most rarely fools with firearms. The maxim that "familiarity breeds contempt" does not apply to the knowledge of weapons, for the person of the "didn't know it was loaded" order is usually someone who has had nothing to do with firearms in their proper place.

To point a gun at any person should in itself constitute a criminal offence, and all firearms must invariably be treated as if loaded; therefore in all drill, preliminary to going into the field, make a point of treating the weapon as loaded. With practice safe handling becomes habitual, and it must be habitual before any sportsman should venture to shoot in company. The man who knows in what direction the muzzle of his gun is directed may be puzzled if it is accidentally

discharged, he is rarely disconcerted, never flurried or alarmed.

This state of complete self-possession is acquired by the practice of always treating the gun as loaded. There is time for a shooter to consider if every shot he fires is aimed in a safe direction, this without interfering with the rapidity or accuracy of the aim, provided he has previously noted in which direction he may fire with safety.

The beginner should first practise the handling of an unloaded gun until he can bring it up sharply and well to cover any point at which he is looking. In shooting, as with other sports, ease of movement is the first requirement, and this is only attained by practice—drill.

To become proficient in the use of the gun it is advisable to handle a gun for a few minutes every day in the shooting season, and at least once a week in spring and summer.

For this drill it is best to take a good position such as that of a crack shot at the trap (*see* illustration)—the left foot should be slightly in advance, the knees straight, the body bent very slightly forward from the hips, the left shoulder brought well forward, which allows a longer reach with the left hand; the gun must be grasped firmly with the right hand, the forefinger on the trigger, the left hand must be got as far forward as will permit of the gun being quickly manipulated, the gun being held well across the body. The left hand



J. A. R. Elliott's Position at the Trap.

well forward gives a better command over the gun, especially with respect to its elevation, but if too far forward it retards a change of aim from left to right.

In taking a double rise from traps, or in making a right and left at game, it is advisable to swing the body with the gun, and change the position of the feet also. Thus, the shooter will be always in practically the same position with respect to the object at which he has to aim. The change of position can, with practice, be accomplished without any loss of time, and the advantages are important. There is greater certainty of aim, and the firing is easier than when the upper half of the body is swung round from the hips.

For marks use something distinctive. A red or black seal, on a white card, is as good as anything. These should be fixed at different heights, and if indoors two should be at least twelve feet apart, standing, as illustration. Look at one of the marks and bring the gun quickly to the shoulder, pressing it firmly into position in doing so. The muzzle of the barrels should cease their motion just under the mark at which you were looking. Put up the gun similarly to other marks, changing from left to right, and high to low, at irregular intervals, until convinced that when your gun is brought to the shoulder, it is directed automatically to the point above mentioned.

To pull the trigger so as not to change the aim,



let the forefinger be well bent, the first joint resting lightly on the trigger, the other joints being held free of the gun. The trigger must be pressed, not pulled, or the alignment of the gun may be altered thereby. Snapping off the gun with a fired case in the chamber will do the gun no injury, and will enable you to determine whether or not the pulling of the trigger affects your aim.

Next try a few shots in the open, either at a wall or shot-proof screen. If the mark is fairly in the centre of the group of shot, practice at moving objects may be commenced.

It is also good practice to walk up to a certain distance, and upon reaching it to raise the gun and fire immediately. When this can be done well, learn to fire the gun when on the march, or nearly so. That is to say, bring the gun to the shoulder at the same time that your left foot goes forward with your body into position. This can be practised until you can be certain of the mark without breaking your regular walk, except for the very instant of firing.

Practise until both barrels can be fired with accuracy, within three steps forward, that is, the steps in which the left foot is advanced.

The main point is to get a good, quick, correct aim, and to fire immediately the gun is to the shoulder. This does not mean that the gun is to be fired in a hurried or haphazard manner; but when the object is in range the gun must be raised and



Position of Carrying a Gun on Shoulder.



Position of Carrying Gun under Arm.

fired. There must be no taking aim as with a rifle, nor must the firing be delayed after the gun is at the shoulder. The shooter who attempts to follow the object by swinging round the gun is a dangerous shot, as will be fully explained later, and cannot become an adept shot until he fires upon the first sight.

There must be no practice at birds or other animals not in motion. Practice at the target is preferable to this sort of shooting, as from it something can be learned.

#### HANDLING THE GUN IN THE FIELD.

Before treating of the art of wing-shooting and its acquirements, a few words on the carrying and use of the gun in the field will not be out of place. The safest method of carrying a loaded gun in the field is to place it, top rib down, on the right shoulder (*see* illustration). Other safe positions are:—Under the right arm, the muzzle straight to the front; across the breast, muzzle high, and well to the front; the muzzle raised, the left side of the stock against the right hip; at the “trail,” that is, grasped in the right hand, the arm at full length, and the gun horizontal.

When standing for driven birds, take a position as recommended for trap-shooting when expecting a shot at game in sight; when waiting, hold the gun in one of the above-mentioned positions, or take one of the positions illustrated, or vary them.

The gun should be carried at full-cock, and if hammerless, with the safety off. Under ordinary conditions, it is better to unload a breech-loader when getting over a fence, crawling through a gap, or jumping a ditch. Even with hammer-guns (most top levers will open at full-cock) it is easy enough to take out the cartridges and reload the gun. Changing the hammers from full to half-cock is a very dangerous practice, or manipulating the safety-bolt of the hammerless only lessens the risk, does not absolutely remove it.

We have seen a man fall in getting over a five-barred gate; luckily for us he had previously unloaded his gun. One may come to grief in getting over a sheep hurdle or at an iron fence; the simpler the obstacle the more careless one is apt to be.

Before putting a gun out of hand, as through a fence, gate, or over a wall, or handing it to another person—unload.

Wire fencing is a great nuisance to shooters, both hands are often required to negotiate it properly—unload the gun before attempting to cross it.

Loaded guns in boats and vehicles are an element of danger.

To load a gun, there are several safe positions which are also convenient. In closing the gun the barrels often swerve to the left. This is especially the case when tight-fitting cartridges are used, or



Easy and Safe Position—Waiting for Driven Game.

the gun is cocked by the act of closing the gun, and care must therefore be taken that the gun is not brought directly across the body. Let the left hand grasp the gun at long distance from the breech, it gives one greater power and facilitates both the opening and the closing of the gun. If an ejector is not used, two loaded cartridges may be taken up and held between the first and second and second and third fingers of the right hand, whilst the fired cases are withdrawn by the thumb and forefinger of the same hand.

The proper position to load a breech-loader is with muzzles pointed to the earth, for it not unfrequently happens that in dry weather, and when using black gunpowder, flakes of the fouling will fall down into the breech action, when the barrels are higher than the breech, upon the gun being opened. The fouling, by lying in the angle of the action, prevents the gun from closing perfectly; this is often very annoying to the shooter who, seeing that the bolts or the lever do not snap home, imagines the gun is broken; or if he be careless and fire the gun in such a state it may allow the breech action to be blown open, being but imperfectly bolted, and thereby result in a serious accident to the user and his companions

To load a muzzle-loading gun, place the butt on the ground, or on your foot, and incline the muzzle well outwards. When you have to load one barrel only, let the loaded barrel be that



Position for Loading.



farthest away ; do not grasp the ramrod with the hand, but with the thumb and forefinger only ; both locks should be at half-cock when loading. Muzzle-loading caps should fit the nipples accurately so as not to burst in putting on ; they may then be taken off easily, but are not likely to drop off ; if waterproofed and capsuled, no fulminate is likely to adhere to the head of the nipple and cause an accidental discharge.

In all cases, the finger should not touch the trigger until the gun is in the act of being raised to the shoulder. Hammers should never be left resting on a cap or striker when the gun is loaded ; let the hammers be carried at full-cock. Look through the barrels before loading the first time after creeping through a fence, and after putting the gun out of hand for any purpose. If one barrel is fired repeatedly without discharging the other, it is advisable to take out the unfired cartridge occasionally, and ascertain whether the top wad has moved, or place the same in barrel which is fired first. With thin brass cases the starting of the charge is more likely to occur than with paper cases having a proper turn-over.

#### THE ART OF WING SHOOTING.

Much is performed automatically by the muscles, and muscular sense, or intuition, varies in degree with different persons. The shooter must look at the bird or other moving object, and

depend upon his own muscles to correctly align the gun, just as a boy watching a cricket-ball will put his hand where he knows the ball will be at a given moment of time, and does not need to look at his hand.

The physiology of shooting was cleverly stated by Dr. W. J. Fleming in a letter to the *Field* of February 19th, 1887—a letter which, we regret, we have not space to reproduce in full, and can but summarise indifferently. It has been demonstrated by actual experiment that what is known as ‘personal error’ in the observation of objects is an important factor in calculating time or distances; astronomers, for instance, need to allow for this “personal error” in recording the time of a star’s appearance at a given point. If two distinct lights are so placed that either may appear or disappear instantly, different observers vary in their ability to quickly determine which light is shown, and record it by the depression of a key; the time required varied from one-hundredth to six-hundredths of a second. If it is assumed that, instead of light appearing, a game bird is the object visible, it follows that before any person can aim his gun at it at least one-hundredth of a second of time will elapse, whilst another person, equally quick in aligning his gun, will not be cognisant of the object seen until upwards of six-hundredths of a second have passed. Consequently it follows that the allowance which one person would rightly make in

order to hit the object would not be correct for another person ; for, taking the two extremes, the object may have moved but 6 inches before known as seen by one, and 3 feet before known as seen by the other.

Anyone with a rudimentary knowledge of optics knows that before seeing an object that is visible several physiological processes are automatically performed by the organs of sight. Its position and its distance from the observer are estimated by the other processes, mainly by the adjustments his eyes require to make to see clearly, compared with previous experience. The principal adjustments are the amount of convergence of the two eyes required to bring their optical axis to a point at the object, and the amount of accommodation necessary to bring the image of the bird to a sharp focus in the retina. These adjustments are made by muscles both within and without the eye, and they inform of the amount by the muscular sense, that same sense which informs whether we have one ounce or a pound weight in our hands. The muscular sense may be trained ; it enables sportsmen to judge accurately of distances, as letter-sorters and others judge of weights to a nicety. As it is dependent upon previous experience, it does not follow that the sportsman who can tell whether a partridge is thirty or fifty yards distant will know as well as a sailor how many leagues distant is a vessel or the letter-sorter estimate the

weight of a bullock. Muscular sense differs in quantity and quality with individuals, and is a matter for special training. The sportsman who wishes to become a good shot must observe carefully and practise constantly. The ability to shoot well is a special gift to some, and though it may be acquired by all, we can only indicate how the skilful use of the shot-gun may be developed. A sportsman may be a first-rate shot, yet unable to explain how he has acquired an unerring aim; some attribute it to one style of aiming, others to a different method, so many discussions take place amongst sportsmen and experts as to the correct method of aligning the gun, and the advocates of the various styles of shooting in the sporting papers detail circumstantially the most opposite experiences.

#### HOLDING AHEAD.

It is not the intention of the author to enter into a long dissertation upon the various merits and disadvantages of "holding on" and "holding ahead." It must be confessed that the advocates of the last method have theoretically the best argument, as the following figures prove:—

The utmost speed at which game birds fly may be taken as forty miles per hour, which means that a bird flying across the shooter at that speed will have travelled about twelve inches before the quickest shooter can have brought his gun to

position and pulled the trigger. The following "delays" may be assumed as unavoidable:—

Time occupied in raising the gun, 3-100ths sec.

Time occupied in pulling trigger, 1-200ths sec.

Time occupied in igniting charge, 1-200ths sec.

Time occupied in shot travelling 40 yards, 14-100ths sec.

During which the bird will have travelled 10 ft. 6 in., or thereabouts, and to hit a mark 10 ft. 6 in. to the right or left of the mark aimed at, the muzzle of the barrel would require to be more than 3 inches to the right or left of the line of aim. As pointed out previously, if, instead of being able to pull the trigger in  $\frac{1}{200}$ th of a second, the shooter needs  $\frac{3}{100}$ ths of a second, the bird will have flown 16 in. further than is stated above.

Even whilst the charge of shot, having left the muzzle, is on its way, sufficient time elapses for a fast-flying bird to travel a considerable distance; for the first fifteen yards or so, it may be taken that for every yard the shot advances the bird travels 2 in. The shot does not maintain its high velocity, and, providing the bird does, we have at forty yards' range nearly 1 in. fled in the time the shot advances 1 ft., and at sixty yards 1½ in. fled for every foot advance made by the shot.

Allowing  $\frac{5}{100}$ ths of a second as the time necessary for performing the involuntary and voluntary actions of seeing the mark, determining to shoot, raising the gun and firing, and also the small fraction of time required for the ignition and

combustion of the powder and its passage through the barrel, we find that with the 12-bore and standard charge at fifteen yards' range, a bird flying at forty miles per hour will have traversed 5 ft. 6 in. before the shot reaches that range from the gun.

If 20 yards, then 6 ft. 6 in.

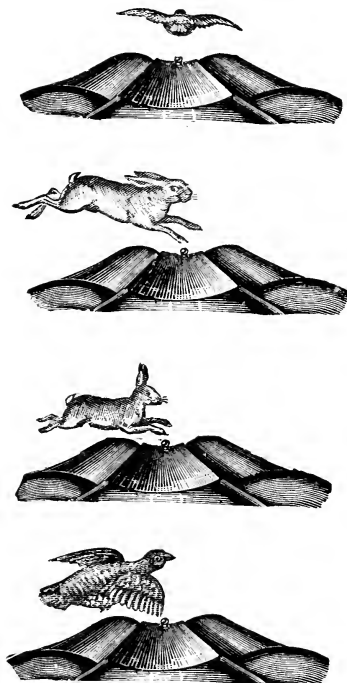
If 30 yards, then 8 ft. 9 in.

If 40 yards, then 11 ft. 5 in.

If 50 yards, then 14 ft. 8 in.

If 60 yards, then 19 ft. 4 in.

A great deal of difference is caused by the manner of bringing up the gun. Some sportsmen acquire the habit of bringing up the gun with a swing in the direction the mark is moving; others bring up the gun and follow the object, whilst the majority of good shots put up the gun and are supposed to jerk it ahead of the game, and fire it before the latter motion has ceased. Those who shoot with the gun on the swing, and intuitively increase the speed of the "swing" in the same action as the increase in speed of the mark, never require to "hold ahead." Those who hold on, by shooting promptly, prove the truth of the theory that it is necessary for the hand and eye to act in unison; whilst they who hold ahead, although agreeing that the hand must follow the eye, yet so shoot that the hand must point the gun in a different direction to the object on which the eye is fixed. If the hand can be entrusted to intuitively direct the gun to any required distance



Showing the Alignment of Gun for Various Shots when Practising the "Hold-on" Principle.

above or before the object upon which the shooter's gaze is fixed, well and good ; perfect shooting will result.

The following hints as to aiming, etc., will be appreciated by all who have convinced themselves that they can, by practice, aim ahead of moving game :—

The young shooter, and all who desire to improve their shooting, should practise in the following manner : Commence by shooting at slow-flying birds, as pheasants (flushed, not driven), pigeons whose wings have been slightly clipped, or at rabbits frisking on the sward. Let all shots be at short range—twenty to thirty yards. When the bird gets up, the gun is to be brought quickly to the shoulder and fired whilst both eyes are looking at the bird.

Birds going straight away, and neither very high nor skimming low down, should all be killed, as the aim is the same as for a snap-shot at a fixed mark. Birds crossing may be missed, probably because the shooter fires behind them. By just how much the gun will be pointed ahead of the cross-flying birds may not be actually observed, but it must be known by the muscular sense, and if the shooter, whilst looking at a fixed object on a large wall or screen, consciously directs the gun (not aiming it by glancing down the rib with the right eye) to the right or left, he will quickly educate the muscles to direct the gun to any



distances right or left of the object seen, and further practice will make him proficient in altering the elevation to any desired extent.

It is always necessary to keep the eyes steadily gazing upon the bird, and no attempt must be made to aim into space. Nor can any instructions as to aiming three, eight, or twenty feet ahead of moving objects be followed. My estimate of twenty feet may differ greatly from that of another, but practice at various ranges and previous experience of similar shots will direct me, as it will everyone who follows these instructions, to aim the gun intuitively in that direction where the charge of shot and the game simultaneously bisect—the one the line of flight, the other the line of fire, so long as the bird is seen.

When practising wing-shooting there will be many misses, of course. After each miss the shooter should consider why the object was missed, and whatsoever cause may be assigned let him do his best to guard against it in the future; if a cross shot, and most probably he was behind the object, he must determine to direct his gun further forward when another similar shot presents itself. If he does this and continues to shoot without being hurried, flustered, or disheartened, he will steadily improve in his shooting, but to go on missing, time after time, without giving a thought as to the cause, will do no good whatever.

When a bird rises, follow its exact course with

your eyes, and when it is in the best position for shooting bring up the gun from below or behind it, and if your hands act in perfect harmony with the eye and the will, as you have schooled them to do, the gun will be aligned instinctively, and immediately the object is in the position indicated in the illustrations well press the trigger. You may stop the gun at the moment of firing or may not; it is immaterial, for your muscles, benefiting by their previous experience, will have performed for you, of their own accord, that order which you have not had time to think out or give them.

It is a good plan to continue the swing of the weapon whilst firing; by so doing you send the charge of shot in the direction in which the gun is moving, but if you have acquired the habit of stopping the swing at the moment of firing, and kill well, there is no need of changing the method. It is a mistake to bring up the gun so that it has to be lowered again in order to cover the object, or to bring it from before the object, though this latter plan is sometimes necessarily followed, as when the shooter facing No. 2 trap gets a quarterer to the left from No. 5, but ordinarily follow the flight of the bird if for the fraction of a second only, then bring up the gun and fire.

The allowances which will have to be made, as already explained, can only be determined by actual experience. The following general indications may, however, be of some service:—

The straight going away shot at birds should be point-blank at any distance.

At ground game going straight away, shoot over the animal. Of approaching shot at birds shoot dead on, unless the bird is very high, when aim well in front. If high at long range and approaching, make less allowance, or wait until it can be shot at a pleasant angle nearer the shooter.

An approaching low shot, when a driven partridge or an "incomer" from the pigeon traps, aim under the bird rather than over it. Birds which cannot be shot as they approach, owing to the position of beaters, etc., must be allowed to pass over, and will furnish similar shots to those obtained by walking up to the birds, but their flight will probably be much quicker, and they will be higher. The bird must, therefore, be shot well under, *i.e.*, actually in front of it. A bird that has passed and flies low is a more difficult shot; the shooter must get ahead of it, and this is only to be done by shooting over it.

Birds crossing to the right are more difficult to hit than those crossing to the left. It is often advisable to move the position by turning one-quarter round on the right foot before raising the gun when there is a quick flyer to the right and you are shooting along or on the right extremity of a line. Longer shots may be made at crossing than at straightaway birds.

Some quartering shots are very easy, others most

difficult—it depends upon the speed and angle of the flight.

Ascending shots are difficult—the most if at short range, and flying quickly, shoot over the bird.

If the bird is well away and going straight or quartering, to get before it, *i.e.*, to hit, it will probably be necessary to aim below it.

Aim at the head of a pheasant rising; indeed, all game of which the head can be seen should be shot at as though the head, not the body, were the sportsman's mark.

Shoot at the head of all ground game. It often happens that incoming and motionless ground game is shot over, and neither hares nor rabbits should be shot at when more than forty yards distant. We have seen men fire at hares fully a quarter of a mile away and blame the gun!

The prettiest of shots, and a difficult one to make, is the perpendicular shot. In attempting this shot bring the left hand much nearer the breech than is usual for any firing at an angle of  $45^{\circ}$  or less and aim in front of the bird if approaching, and under it if going away.

Occasionally shots may be had at birds and hares descending, chiefly when shooting on the hillside, and these shots are difficult, the sportsman generally shooting over his game. Low flying wild-fowl, woodpigeons coming into lofty trees, hawks, crows, and vermin, generally afford different shooting practice, of which the sportsman will

profit. In order to become an expert shot, if other game is not readily available, starlings, fieldfare, larks, and even sparrows, may be used as marks, and much learned from shooting at them.

To practise systematically nothing is so handy as trap shooting, almost a separate art, but one which may be followed with beneficial results even by expert game shots.

#### OF HOLDING ON.

Snap-shooting and the "hold-on" principle of aiming is synonymous. I fail to see how anyone firing a snap-shot—as I understand it—can possibly hold ahead with any amount of certainty, for the space of time which the opportunity affords in many cases is only sufficient to take in the situation, and fire; it will not allow even for a mental calculation. I favour the "hold-on" and snap-shooting system for several reasons, chief of which are—it is prettier, safer, and in our opinion surer, and it offers, to say the least of it, many more chances of a full bag than the slower way of aiming. First, it will be admitted that the *style* is far better in snap-shooting than in the "hold ahead" practice; second, it is safer, in so far that there is no tendency to "poking," which the hold ahead and slow calculating shots lean to, even though a little—a little which with young shooters is likely to become more. It must be remembered that "the man who hesitates is lost;" hesitation in

firing, at any rate, means loss of game and perhaps everything else except experience to the shooter.

An instance of the danger of the "poking" aim once warned us of the dangers of the system even when practised by a sportsman and regular shooter of twenty-five years' standing who, on one occasion, allowed himself to be carried away by his excitement to the extent of "following up" a partridge at least three parts of a circle before firing. The bird rose on his left and flew low across his front quartering to the right until it had nearly completed the circle before it fell to the long-expected shot. The shooter had his gun to the shoulder the whole of the time the bird was on the wing, and in following up and trying to make the proper allowance his gun covered many of his companions, the beaters, and dogs, although, in the end, the bird only was shot; the attitude of the shooter appeared extremely ludicrous to the others of the party after the muzzles of the gun were directed towards a safe quarter. Third, very many more opportunities occur for a snap-shot and to one accustomed to take them than to one practising the slower methods.

For instance, when shooting cover, either in line, alone, or by beaters.

After reading those paragraphs in this chapter relating to the physiology of shooting and optics the reader will probably understand more of the reasons why I favour the "snap- or hold-on"

system ; it is, moreover, much easier to become proficient at this style than at the other, and therefore more easily learnt. I am not so much in favour of copying a good shot's style ; everyone is built differently, and has different degrees of muscular sense ; therefore everyone should find out for himself the method that suits him. To give one confidence there is only one necessity, and that is, that the shooter can rely on his gun coming up to the shoulder exactly to the same position every time.

#### OF POSITION IN SHOOTING AND THE ALIGNMENT OF THE GUN.

The accompanying illustrations show several positions in shooting and the proper alignment of the gun for game taking different directions of flight ; these will be found to be pretty nearly correct, and at any rate will serve as a basis upon which young shooters may begin. The illustrations in this chapter showing positions of the gun for different shots we hope will be some kind of a guide for the beginner as to the fit and handling of his gun. It will be seen that we hold to the old style of allowing the stock of the gun at the comb to lie against the cheek ; by this one is able to tell that the gun is in exact position. If the shooter has good command over it, he should fire the instant the stock touches his face ; by always adopting one position for the head, shoulders, body, and feet, with the touch of the stock on the

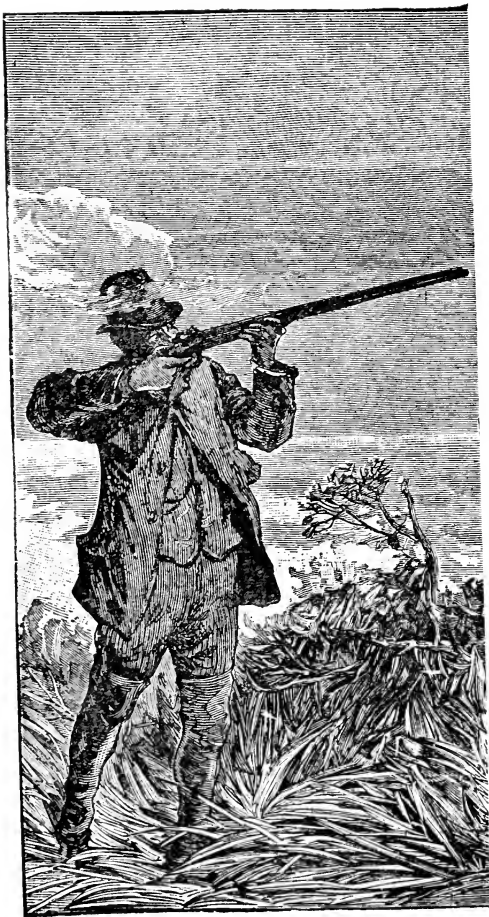


Showing Position for Ordinary Straight-away and Rising Shots.





Showing Greatest Angle at which Overhead Shots should be Taken.



Bad Position, not to be Imitated.



The above position shows how the muzzles of the gun should be when firing; unless they are perfectly square, bad shooting will result with one barrel. The habit of getting the left barrel higher than the right must be guarded against; it is a frequent occurrence with some sportsmen just when pulling the trigger to give the gun a twist over to the right. By aiming at a mirror and pulling the trigger any fault of this kind will be easily detected.

cheek as an indication for the time to fire, one will very soon make good progress in the art of snap-shooting.

Some quick shots, however, anticipate the time it takes to *fire* the gun and pull the trigger whilst raising the gun to the shoulder. This requires considerable practice to perfect, and the gun must, of course, be within an ace of the proper position; but, however the practice may be deprecated, it is certainly *au fait* for trap- as well as general snap-shooting.

For high overhead shots it is not advisable to shoot at a greater angle than that shown in position (page 239); this is quite awkward enough, and even then the certainty of the alignment is not so effective, owing to the left hand having to be held nearer to the breech.

For cross-shots, although in theory the gun should be held ahead, in some cases as much as 7 ft. at forty yards, yet in practice we have found that in holding on to the head, as on page 229, was quite sufficient allowance to kill, though in many cross-shots at any angle not above 45 degrees the gun is always brought up from behind. It may be that the swing has the effect of throwing the muzzles more in that direction than intended by alignment. If the gun is fired before the motion is stayed, the shot will, of course, fly in that direction in which the gun was swinging when the charge of shot left the muzzle.

## CHAPTER VIII.

OF SHOOTING GENERALLY—THE ETIQUETTE OF FIELD AND COVER—HOW TO OBTAIN SPORT AND ENJOY IT—HOW TO FIND GAME—SHOOTING EXPENSES.

THE sportsmanlike use of the shot-gun implies much more than is included in good marksmanship.

The sportsman not only uses his gun, but must exercise his brains in order to use it properly. It is important to acquire an accurate judgment of distance in order to determine what is, and what is not, a sporting range at which to fire; it is also advisable to observe carefully the result of each shot, and mark where the game was struck; this may save much time in retrieving wounded birds, but for the old-fashioned art of woodcraft there is little demand now, and good and safe marksmanship is considered a better qualification.

The modern style of shooting is the natural result of present day methods of agriculture. The scythe and reaping machine have succeeded the sickle, and the stubbles are now shorn so close that they do not afford cover to partridges, and when partridges resort to them, as they do, to feed, at certain hours of the day, it is generally quite

impossible to approach within range either with or without dogs.

The sowing of root crops in rows has also spoiled the chance of the dogs in the turnips; the birds sneak out of the field as soon as the men and dogs enter it, as the game can see from one end of the field to the other, and cunningly escape unobserved. The sportsman who is determined to have some shooting, resorts to driving, by which means he accomplishes his purpose, and also makes the game much more wild.

The sportsman who is determined to shoot over dogs and hunt his game in the old-fashioned way will find full instructions in the many books on shooting which have been published, but will need considerable experience before becoming successful. The fact that changed conditions have greatly handicapped his chances, and have forced sportsmen to other methods, may not deter him from persevering in his method, and it is quite possible, with hard work and much cunning, to outmanœuvre a few coveys by what practically amounts to stalking them; no one will grudge the sportsman whatever success he ultimately achieves.

The sportsman whose shoot is small and the game—not being hand-reared—scarce and wild, will be unable to practise driving to any advantage; the best plan will be to walk up to the birds as afterwards described. The drive, or *battue* as it is more commonly called, is the best manner for a

proprietor or lessee to demonstrate the quantity of game upon the estate, and it is generally the only way of securing a fair proportion of it.

To organise a drive upon a fairly large scale the assistance of many men as beaters will be required; the plan is therefore only suited to a large party, and its management is a business requiring much knowledge, forethought, and preparation. The methods employed with the greatest chance of success are detailed in such a book as "Shooting" of the Badminton Series, to which we must refer the reader for further information as to the management, or what may be called the "engineering" of work of this kind. The host or other responsible director, if he does what is considered to be his duty to the shooters, will see very little of sport and will have an onerous task to perform.

As to the shooters, they will learn very little of woodcraft or of the habits and habitat of the game, but they may have ample opportunities for testing their skill as marksmen and of observing the peculiarities of the flight of frightened birds; and they may rightly enjoy the day's sport, in which they do not so much participate as—to use a Gallicism—assist.

The shooter called upon to take part in a day's sport of this kind will find, if partridges be the game sought, that the keepers or their assistants have, previous to the arrival of the guns, driven the

birds into a convenient field with sufficient cover to hold them, that is, with a growth which will hide the birds. The shooters are then posted behind a tall fence, barrier, or even artificial screens, which will conceal them; they should be such as, whilst hiding the shooters, will permit them to observe the flight of the birds when driven towards them.

The shooter should be informed of the location of the other shooters and the direction in which the beaters will advance, and then go at once to his stand and wait quietly and expectant until the warning "mark over" of the beaters informs him that birds are on the wing.

All alert then, he will, as soon as any bird comes within range and within his circuit, be ready to fire. In some positions he may be able to fire at the birds as they approach; in others he must wait until they have passed over. Frequently two shooters will be stationed together; it is usual for one to take birds on the left and the other birds on the right—a rule which must be loyally observed, and to which the only exception is the firing at your companion's birds after he has fired both barrels and the birds are in range.

In partridge-driving the stations are frequently changed, and the object is to break up the coveys as early as possible in the day, marking the escaped birds down, and putting them up again and again in successive drives, so that often a covey from



which little is bagged in the morning will afford excellent sport later in the day.

Pheasant-driving is pursued, not so much for the sake of securing shots at the birds, as is the case with partridge-driving, but for the object of obtaining sporting shots.

The drive is, or should be, so managed that the birds are forced to rise at some distance from the shooters, and consequently approach at a good height, and flying faster than if put up as straggling birds in hedgerows or cover. Here, again, the shooter will be called upon to exercise his skill as a wing shot. There will be little walking—no hunting in the true sense—and the man who can keep cool, shoot deliberately, and observes the usual etiquette of the shooting-field, will probably enjoy good sport, unspoiled by blank covers or too wary birds.

Some guns are usually told off to walk up with the beaters. These do not, as a rule, get so much shooting as those posted in the line towards which the game is driven; they see more of the working of the "battue," and require to be even more careful, both as to the direction in which they shoot and when to fire.

Grouse-driving has become very popular with all able to rent or subscribe to a moor. The guns are stationed in batteries, boxes, or shelters, especially constructed for the purpose. In Derbyshire they are occasionally posted behind the stone walls common to the country. Fifteen to twenty

beaters will drive, commencing a mile from the guns, and form a line, nearly half a mile in length, beating towards the centre. Driven grouse fly at great speed, and afford excellent opportunities for a display of skilful marksmanship.

The young shooter will do well to observe most punctiliously the written rules and accepted conventionalities of the shooting-field. Smartness of manner is considered very bad form. A young man is not supposed to be an unerring shot, nor expected to tell good stories. If a shooting companion, older than yourself, and a shot of established reputation, fires both barrels at a bird, and misses, it is better to let the bird go, even though within range, than "drop" it, to your companion's mortification. You have life before you, and may get other opportunities. Don't shoot to wound game, but to kill it. If a wounded bird struggles in front of you from a companion's gun, drop it if you can. Explain to the first shooter that you did so to save time in gathering it, or remark, simply, "Yours."

The compilers of books of instructions to young shooters deem it necessary to advise beginners against calling attention to the clever shots they make. It has never been the writer's luck to meet with young sportsmen guilty of this practice; they are prone to remark "clever shot," or "that was well done," when someone else has brought down a difficult bird, when perhaps absolute

silence would have been preferable. They will talk of their performances at other times, and so unfortunately will older men, who ought to know better.

In order to stand well in with shooting companions, and your host, or his keepers, avoid risky shots, make yourself well acquainted with your gun's power, and shoot at nothing not well within its range, and do not bang away at game too close. Learn to judge distances accurately, and you will make few mistakes on this score. Give fair play to the game, and to your fellow-shooters, and if a man near you is getting more shooting than he can manage, whilst you have none, it is his place to call you to help him, not yours to edge up to him. Think of this when you have more than your full share of luck.

When walking in line up to birds, or with the beaters in covert, mind and keep to that line. It is dangerous to you and your companions to be either ahead or behind it.

When shooting with one friend, take the birds in the covey nearest to you, and ground game directly before you.

To fire at low birds and ground game in covert is frequently very dangerous. In the same way low birds coming towards you from the line of beaters must not be shot at unless you know that the beaters are well beyond the range of your gun.

Do not fire at anything you imagine to be a

rabbit moving in covert; this is the way dogs, foxes, and sometimes beaters, get shot.

Do not waste your time and that of your companions by insisting upon a bird you *thought* you saw fall being retrieved.

When shooting alone, or over dogs, the sportsman has greater latitude as to what, when, where, and how to shoot.

The shooting of grouse over dogs is fully treated in all old sporting works and several modern ones. The well-known authority upon sporting dogs, "H. H.," will probably republish a book from the excellent series of articles now appearing in a sporting paper. If these should not be procurable, the sportsman in want of information may refer to Thornhill, Craven, or F. Speedy.

To get partridges, when not shooting over dogs, a small party will find it best to walk up to them, with one or more beaters or keepers to mark and gather the birds and work the retrievers, which will add greatly to the success and enjoyment of what is the finest of modern field sports followed in this country.

In the early morning the partridges are usually to be found feeding in the stubbles, and as it is next to useless to attempt to get within range of them there, it will save time if two or three men will walk the stubbles before the shooting is commenced, and thus send the birds to better cover.

A mixed line of shooters, beaters, and keepers

is then formed, and if game be plentiful it is advisable to have as many retrievers as there are shooters, as better speed will be made if beaters or keepers are not occupied in picking up, and can look after wounded and towering birds; a badly broken dog, will, however, prove the greatest nuisance which can be introduced into the party. The beaters should also mark as nearly as possible where each bird has fallen, and in this they can also be aided by the shooters; a mark from different positions on the base line of the triangle will frequently save a prolonged search by confirming accurately or rectifying an error in marking.

In turnips, partridges are always more easily approached if the party make their progress across the drills. If it is preferable to walk in a line with the drills in order to drive the partridges towards any other particular cover each man should change frequently a few steps to the right and left of the drill in his direct line.

When there is no object to be gained by driving the birds in any particular direction the line will wheel at the end of the field and take the next strip, otherwise the steps may be retraced over the ground already traversed, and the line re-formed so that the field may be worked uniformly in the one direction; as the field is worked to the finish the flank men of the line will advance so as to hem in any birds which may have moved to the extremity of the field and are unwilling to leave it,

A line, instead of being formed at right angles to the fence, may traverse it in *échelon*, i.e., at an angle, a manœuvre often successful ; also, when the shooters may be relied upon to shoot carefully, instead of a straight line the party may form so that the shooters and beaters at the flanks will keep in advance of those in the centre. A line almost semicircular will sometimes prove effectual, or other modifications may be made to accomplish a particular object, but this can only be done with safety when one and all carry out the plan with mathematical exactness. When working the bowed line it is only fair to the shooters that in wheeling the pivot man is alternately at the right and left extremity of the line. If the line is re-formed each time the field is traversed the party should either cross over, equalising chances, or one half should do so, thus bringing the flank men to the centre and the centre men to the flank alternately.

In stalking partridges do not attempt to get near them in a direct line, but walk half round the covey, closing in gradually to the flushing point. If the party divide to the right and left, and carry out this manœuvre carefully, it is possible that the party flushing the covey will drive the escaping birds within range of the other division and thus increase the chances of securing the majority of the birds.

Late in the season, when the birds "pack," driving is the most effectual method of making a bag.

The use of kites is said to have the effect of driving the game to other ground, and should, therefore, be used rarely by proprietors. Lessors sometimes stipulate that kites shall not be used.

A shooting leased of farmers cannot be well preserved without great expense, and some farms are so badly situated that the game bred upon it frequents neighbouring lands in preference. Some lessors obtain high prices for shooting which it is almost impossible to work with satisfactory results. More game can sometimes be bagged from land the shooting rights of which are sold for sixpence an acre, than other ground in the same locality for which five times the price is obtained. The price paid for shooting bears no relation whatever to its value.

Where the shooting is small, a couple of hundred acres or so, and the land well farmed, it is advisable to stipulate that at least a few acres shall be sown with something that will afford suitable cover to the birds late in the season. Turnips, potatoes, clover, mustard, etc., are good ; but to hold the birds late in the season, if there is no natural cover on the shooting, a patch of buck-wheat will afford that protection and shelter the birds prefer ; grass, furze, fern, ample hedgerows, and some planted cover, will attract partridges, and in order to increase the stock the birds, except old cock-birds, should not be shot after December.

If an attempt is made to rear pheasants there

must be a "pheasantry," or suitable plantation on the shooting, and at least a couple of men to look after the birds ; a trouble when increasing the stock of pheasants on a small shooting is the greater relative expense compared with that of doing the work on a larger scale, and the difficulty of keeping the birds at home. To raise pheasants for your neighbours' shooting is often unavoidable, and if the covert frequented by pheasants is made more attractive by often placing tempting food there, a stock may be increased by birds from adjacent coverts ; barley, beans, malt, raisins, etc., are used for this purpose, and it is said that a few hundred of common gooseberry-bushes planted as under-wood makes a first-rate cover.

Hares are becoming scarce in this country ; they are an easy shot even when driven with other game. They may be looked for on fallows, grass-land, and amongst turnips. In Scotland the Alpine hare, a different variety, is plentiful, and these hares are often driven, owing to the nature of the ground ; hitting them is more difficult than on a fallow field in the south.

The woodcock is, unfortunately, still more rarely found ; put up in thick cover and taking an irregular flight it is one of the most difficult birds to bag ; if shot at close to it will probably be missed, if the sportsman waits it will be lost sight of in the covert, its turn to right and left being most erratic and unexpected.



Rabbit shooting is the easiest shooting obtainable in this country, and there are very few people fond of shooting who cannot command, at least, a few days' sport of a friendly farmer or land-owner.

Rabbit shooting, the most generally practised of sports with the shot-gun, is the most dangerous; firstly, because all the firing is done with the gun pointing towards the ground; and secondly, because the speed with which the rabbit bolts is provocative of random shooting. It is not uncommon for a rabbit to run between the shooter's legs and be shot within three yards of him by some reckless shooter on the alert for fur. In a warren or quarry a rabbit about to disappear over a ridge will be shot neatly just as the hat of a man on the other side becomes visible. When ferreting, it is quite impossible to keep men from getting into places where, for their own safety, they should not be. The young sportsman can more easily do irreparable damage when rabbiting than at any other sport, and must consequently use the utmost care to avoid accident. Always fire at the head of a rabbit, and to shoot safely in covert do not make a shot at where the rabbit will be, but shoot straight for him or not at all.

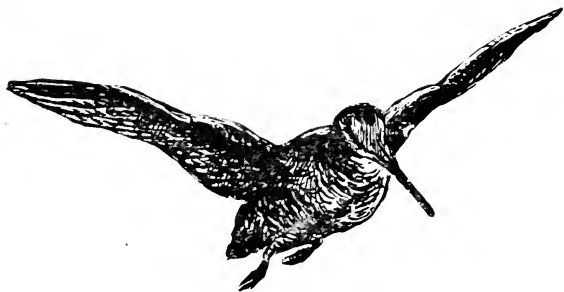
Another dangerous practice is the division of shooters by a substantial hedge with dogs working the hedgerows, the rabbits will run out and straight along the hedge and then run in again. It

is unadvisable to shoot towards the hedge under any pretence ; dangerous to do so unless you know exactly the position of the man, or men, on the other side of it.

If rabbits are put out properly and the shooters keep well back, good shots may be obtained when the rabbits make a run across the open for fresh cover.

The young shooter may ruin his prospects as a sportsman by a single indiscretion—the making of a risky or a dangerous shot ; he will not be an acceptable companion to shooting men unless he endeavours to kill his game in a sportsmanlike manner, avoiding the wounding of game, and not firing at quite impossible distances.

The man who may be relied upon as safe to shoot with under every condition, and who, in addition, is better pleased by killing a few birds in a clean and sportsmanlike manner than in making a heavy bag, will have opportunities for obtaining sport denied, on principle, to others.



## CHAPTER IX.

PIGEONS AND TRAPS—BOUNDARIES—RULES—MODIFICATIONS—RECORD MATCHES—HINTS ON LIVE BIRD SHOOTING—INANIMATE TARGETS—RULES—BEST SCORES—HOW EXPERTS SHOOT—GUN TRIALS—LONG SHOTS—GROUSE DRIVING, BY SIR F. A. MILBANK.

## TRAP SHOOTING.

PIGEON shooting, against the practice of which many sportsmen protest, unlike British field sports, is of lowly origin, but for several generations it has been a popular pastime with many of the best known sportsmen of this country and is practised fairly and legitimately in all parts of the world. At all respectable clubs there is no cruel treatment of the birds and fair play is accorded to every shooter. Pigeon shooting has long been a holiday pastime with the frequenters of low public-houses, and has been and still is used as a means by sharpers to fleece the unwary young sportsman. It is wise to shoot pigeons at recognised clubs only, whether in England or elsewhere; and before accepting an invitation to shoot a friendly match, to make sure of the character of the person who invites the contest, or experience at the trap may be very dearly bought.

Pigeon shooting as a sport may be said to date

from about the middle of this century, although there were occasional matches and contests earlier. The first handicap is said to have been shot upon Mr. Purdey's grounds at Willesden in 1856, but previous to this there had been fashionable contests at the "Old Hats" public-house, on the Uxbridge Road at Ealing, near London. The "Old Hats" obtained its name from the fact that the pigeons used for the matches were placed in holes in the ground, and were covered with old hats. The "Red House" at Battersea was afterwards the favourite metropolitan resort for wager shooting. The first *bonâ-fide* pigeon club was formed at "Hornsey Wood House." Traps were used here, and the "small cannon" which were formerly in vogue as pigeon guns were discountenanced, and the ordinary double-barrelled fowling-piece substituted.

#### PIGEONS AND TRAPS.

The pigeon generally employed for trap purposes is known as the Blue Rock. The best variety, the Lincolnshire Tin Blue Rock, retain the wild nature of the common blue Coast Pigeon. They are fed in Lincolnshire by the farmers in winter time, who also raise cotes for them at a good distance from their other buildings, as the wilder the birds and the nearer the coast they are raised the stronger and more hardy they are. The true Tin Blue Rocks afford the best sport, and are much the hardest to kill, being small in the body, quick in flight at

starting, tough in their nature, and game to the death, especially the hens.

Other Blue Rocks are bred in Oxfordshire and



The Coast Pigeon (Blue Rock).

Yorkshire in large quantities, but are inferior to the Lincoln birds.

Many of the so-called Blue Rocks are also imported from Antwerp; in fact, the greater portion of the pigeons used for trap shooting are brought over from that port, and sold here as Tin Rocks. Some years ago a number of Tin Rocks were exported to France and Belgium for breeding

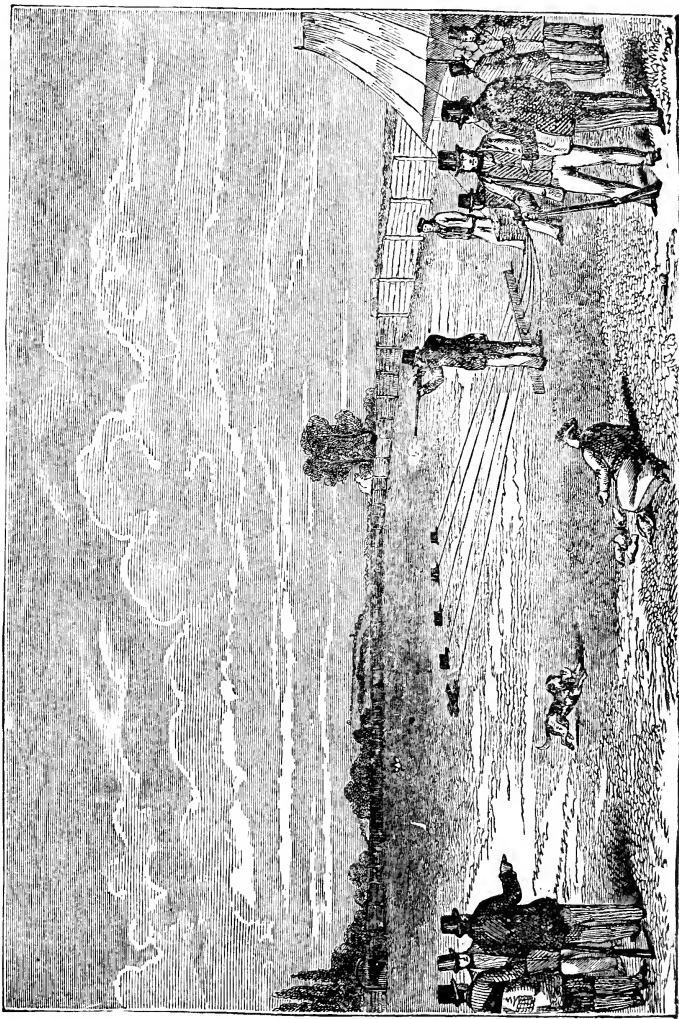
purposes, and their offspring is now imported ; the foreign climate has not improved them, as they possess little of the gameness peculiar to the English bird.

The real Rock is not always of the same marking; there are light and speckled Rocks.

Pigeons intended for trap shooting should not be used to being handled, and at the principal clubs several stringent rules are in force against any ill-treatment or mutilation of the birds. The purveyor to the club should find it to his interest to supply the best, that is the strongest, healthiest birds, and the trapper should be the servant of the purveyor, so that it is to his interest that the birds fly strongly. The hampers used should be spacious and well ventilated and a proper place should be provided for them under shelter or in the shade. The retrieved birds should be placed on or near the hampers containing the living pigeons. The purveyor should provide good dogs for retrieving. The puller should be a club servant.

Then if the ground be properly laid out and arranged and the standard rules adhered to, any collusion as to the trapping of weak birds may be prevented and any form of dishonesty, except the wilful missing of birds, may be guarded against.

The pulling apparatus should be of the very best. Buss' is a very good one ; that used at Monte Carlo and the Hurlingham pulling apparatus is also good. The traps must not be too small



Pigeon Shooting at Hornsey Wood.

and should work smoothly, being flush with the ground when pulled over. The cords or wires to operate them should be underground.

#### PIGEON-SHOOTING BOUNDARIES.

Boundaries vary to 20 yards. The Hurlingham boundary is 90 yards from the centre trap, and the enclosure fence 8 ft. high. The Gun Club boundary is 65 yards and the fence 9ft. The Monaco boundary is 17 metres (about 18½ yards) and the fence only 3ft. 4in. high.

An ideal ground would have a fence about 8ft. high at least, with reserved ground outside this fence that wounded birds may be readily recovered. At Monaco and Paris the birds fall into the water.

The handicap distances should be available from 81 to 35 yards from the centre trap; the puller should be at or near the 30 yards firing point.

#### RULES OF LIVE BIRD SHOOTING.

In England, as well as in America, the English Colonies, and in most clubs founded upon the same basis as our English clubs, the Hurlingham Rules are accepted without important modifications. At the Gun Club, and at Hurlingham, the weight of the gun is now unlimited.

#### THE HURLINGHAM CLUB RULES.

1. The referee's decision shall be final.
2. The gun must not be held to the shoulder until the shooter has called "Pull." The gun must be clear



- below the armpit, otherwise the referee shall declare no bird.
3. A miss-fire is no shot under any circumstances.
  4. If the shooter's gun miss fire with the first barrel, and he use the second and miss, the bird is to be scored lost.
  5. If the miss-fire occurs with the second barrel, the shooter having failed to kill with his first, he may claim another bird ; but he must fire off the first barrel with a cap on, and a full charge of powder, before firing the second.
  6. The shooter's feet shall be behind the shooting mark until after his gun is discharged. If, in the opinion of the referee, the shooter is balked by any antagonist or looker-on, or by the trapper, whether by accident or otherwise, he may be allowed another bird.
  7. The shooter, when he is at his mark ready to shoot, shall give the caution "Are you ready?" to the puller, and then call "Pull." Should the trap be pulled without the word being given, the shooter may take the bird or not ; but if he fires, the bird must be deemed to be taken.
  8. If, on the trap being pulled, the bird does not rise, it is at the option of the shooter to take it or not ; if not, he must declare it by saying "No bird" ; but should he fire after declaring, it is not to be scored for or against him.
  9. Each bird must be recovered within the boundary, if required by any party interested, or it must be scored lost.
  10. If a bird that has been shot at perches or settles on the top of the fence, or on any part of the buildings higher than the fence, it is to be scored a lost bird.
  11. If a bird once out of the ground should return and fall dead within the boundary, it must be scored a lost bird.
  12. If the shooter advances to the mark and orders the trap to be pulled, and does not shoot at the bird, or his gun is not properly loaded, or does not go off owing to his own negligence, that bird is to be scored lost.

13. A bird shot on the ground with the first barrel is "No bird," but it may be shot on the ground with the second barrel, if it has been fired at with the first barrel while on the wing; but if the shooter misses with the first and discharges his second barrel, it is to be accounted a lost bird, in case of not falling within bounds.
14. All birds must be gathered by the dog or trapper, and no member shall have the right to gather his own bird, or to touch it with his hand or gun.
15. In single shooting, if more than one bird is liberated, the shooter may call "No bird," and claim another shot; but if he shoots, he must abide by the consequences.
16. The shooter must not leave the shooting mark under any pretence to follow up any bird that will not rise, nor may he return to his mark after he has once quitted it to fire his second barrel.
17. Any shooter found to have in his gun more shot than is allowed, is to be at once disqualified. Any loader supplying in sweepstakes or matches cartridges loaded in excess of the authorised charge, will be dismissed from the Club grounds.
18. None but members can shoot except on the occasion of private matches.
19. No wire cartridges or concentrators allowed, or other substance to be mixed with the shot.
20. In all handicaps, sweepstakes, or matches, the standard bore of the gun is No. 12. Members shooting with less to go in at the rate of half a yard for every bore less than 12 down to 16-bore. Eleven-bore guns to stand back half a yard from the handicap distance, and no guns over 11-bore allowed.
21. The winner of a sweepstakes of the value of ten sovereigns, including his own stake, goes back two yards; under that sum, one yard, provided there be over five shooters. Members saving or dividing in an advertised event will be handicapped accordingly.

22. Should any member kill a bird at a distance nearer than that at which he is handicapped, it shall be scored no bird, but should he miss, a lost bird.
23.  $1\frac{1}{4}$  oz. of shot and 4 drams of black powder, or its equivalent in any other description of powder, is the maximum charge. Size of shot restricted to Nos. 5, 6, 7, and 8.
24. All muzzle-loaders should be loaded with shot from the club bowls.
25. If any bird escapes through any opening in the paling it shall be a "No bird."

## RULES FOR DOUBLE RISES.

1. In Double Shooting, when more than two traps are pulled, the shooter may call "No birds," and claim two more ; but if he shoots, he must abide by the consequences.
2. If, on the traps being pulled, the birds do not rise, it is at the option of the shooter to take them or not. If not, he must declare by saying "No birds"
3. If, on the traps being pulled, one bird does not rise, he cannot demand another double rise ; but he must wait and take the bird when it flies.
4. A bird shot on the ground, if the other bird is missed, is a lost bird ; but if the other bird is killed, the shooter may demand another two birds.
5. If the shooter's gun misses fire with the first barrel, he may demand another two birds ; but if he fires his second barrel, he must abide by the consequences. If the miss-fire occurs with the second barrel, the shooter having killed with the first, he may demand another bird, but may only use one barrel ; if he missed with the first barrel Rule 5 in Single Shooting will apply.

## MODIFICATIONS.

On the Continent the rules of the Cercle des

Patineurs of Paris are usually adhered to, they are practically the Hurlingham Rules. The charge is limited: 4 drams of powder by measure, and  $1\frac{1}{4}$  oz. of shot, is the maximum; the boundary is 87 yards (80 metres) from the pavilion; 54 yards from the centre trap, the traps are 5 metres from each other.

The shooter has a right to another bird if his gun miss-fires or refuses to go off through any fault not his own.

The pigeon is lost if the shooter has neglected to cock his gun, to load it, or to place on the cap.

If the first barrel misses fire, and the shooter fires the second, he loses his right to another pigeon, unless the second barrel also miss-fires.

If the second barrel misses fire, the shooter having fired and missed the bird with the first, he may claim another bird; but in that case both barrels must be loaded, the first with powder only, and neither barrel must be discharged until after the trap is sprung.

It is forbidden to shoot both barrels at the same time.

The standard gauge is twelve, any gun of larger bore than this is handicapped half a metre for each size; thus ten bores, the maximum bore allowed, stand one metre back, fourteen bores advance half a metre, sixteen bores one metre; no further advantage is allowed to any smaller bore.

#### HINTS ON TRAP SHOOTING.

Trap shooting cannot be recommended as a profession. However good a shot a sportsman may be he will find so many uncertainties in trap

shooting that it is doubtful if any person shooting continually will make trap shooting pay expenses.

At an ordinary bird, shot at under Hurlingham rules by an average good shot, the chances are five to two in favour of the shooter. To be considered a good shot the number of kills must average more than 70 per cent. Mr. "Grace," at one time considered a reliable shot, with a Greener Gun once scored a percentage of 84·3 kills in a series of International contests. Other shooters have occasionally made a higher percentage in a short series of matches.

In a series of International matches, out of 1,120 birds shot at by thirty-six different shooters, 79·9 per cent. were killed, and this is about the average in matches between first-rate shots.

The following hints may be of use to young shooters who wish to try their skill in trap shooting:—Commence at a short distance—say 18 yards—at live birds; stand in an easy position, gripping the gun well forward with the left hand. This is a great aid in quick shooting. Do not stare at the trap which you think will give the most difficult shot to you, and if you do not particularly regard any trap so much the better.\* Do not say "Pull" until you are quite ready to shoot, and have your attention concentrated upon what you are about to do. When the bird gets up, up with the gun

\* Captain Brewer's position is facing the fourth trap, as he considers it easier to turn to the left.

quickly but steadily, and immediately you have it in place at the shoulder it should be aligned at the bird, and the trigger pulled. Pigeon guns should be so constructed that at forty yards' range they will throw the body of the charge a few inches higher than the line of aim; consequently, at any distance up to forty-five yards you will have the advantage over a bird rising in flight.

When shooting at thirty yards' rise, this quality of the gun will be the more requisite, as to be a sure trap-shot you will require generally to kill your pigeon within four or five yards of the trap, and for that distance the pigeon generally rises, and if he does not do so immediately will, in all probability, do so long before he is out of range. The happy medium between snapping just over the trap and "poking" after the pigeon must be sought.

In choosing a gun all will depend upon the rules under which it will be used, but it may be said that, as a rule, a gun of  $7\frac{1}{2}$  lbs. will be the thing. Let it be taken from the rack just before going to the mark, and let a point be made of loading and cocking it methodically. Quite a large number of birds are scored lost every year because the shooter has forgotten to cock his gun, move the safety off, or some other cause, equally easy to prevent.

Hammerless-guns with automatically-bolting safeties are a great nuisance when pigeon-shooting. A hammerless pigeon gun should not have any safety upon it. If there is a safety it should be of

independent action, and the trap-shooter will do wisely to have a screw pin put through it to prevent it being meddled with, or inadvertently put "on" by himself. As pigeon-guns are not loaded until the shooter is at the firing point, the gun is as safe without as with a locking safety bolt.

It is best to take no heed either of bystanders or trappers when going to the mark, and if one can be quite deaf to the shouts from the "ring" the score is likely to benefit.

In contending in a handicap it is the time spent in waiting between the rounds that tires and tries nerve and patience. At Monte Carlo a man may have to fire but nine times, and possibly have the whole of two afternoons in which to do it. Very much, therefore, will depend upon the temperament of the shooter. In contesting a match at 100 birds it must be remembered that the task will be trying to endurance; and if a lighter gun can be found which suits as well as a heavy one, the use of it will enhance the shooter's chance of success. The shortest time occupied by the match will be two hours and a half, and it may drag along for double that time.

In match shooting the percentage of birds killed will be greater than in handicap shooting, and unless the shooter knows, by experience or former practice, that he can kill on the average ninety birds out of one hundred, he will do best not to contest a match with the best shots of the day.

Drive straight to the shooting-ground, so as to

arrive at the time the shooting is advertised to commence. Waste no time in plating your gun. If the results of the shooting at the target should not please you, you will lose confidence in your gun and gain nothing. You should ascertain that the gun shoots well, and that the cartridges are suitably loaded *before* you get to the shooting-ground. Keep yourself to the matter in hand, and pay no attention either to the remarks of other contestants or the "betting." Having won or lost, leave the ground at once. Unless the ground is one not often visited, trial shots before the serious shooting commences are not to be recommended. Upon visiting a town for the purpose of contesting the International Tournaments, it is best to lodge at some distance from the shooting-ground, and to go there only so often as the business of the contests may require. Nothing is gained by constantly hanging about in the vicinity of the shooting-ground, nor by experimenting upon it. You should go to the ground to kill every bird at which you shoot; you must practise and experiment upon a private ground elsewhere.

A little experience will soon prove to the young shooter whether it is best to take or leave a pigeon which does not rise immediately the trap is sprung, and in other ways how to *win*, providing he is a good shot, and can keep in perfect health.

#### PIGEON SHOOTING SCORES.

As shooters are always pleased to compare



their own performances with those of acknowledged experts, the following accounts of matches, compiled from various sources, will occasionally be useful for reference.

In a series of three matches between Mr. E. D. Fulford and Captain Brewer in November, 1891, at New York, 100 birds each at 30 yards, Mr. Fulford, using a gun by W. W. Greener, scored the full number to his opponent's 99. The following day the scores were—Fulford, 99; Brewer, 98; the 95th bird shot at by Mr. Fulford fell dead out of bounds, thus practically 200 consecutive shots resulted in 200 kills, a truly marvellous performance which certainly no game shot could equal. This was the highest score ever made at the trap. The third match resulted in a tie, both gentlemen scoring 94 each. The tie was immediately shot off at 25 birds each, Captain Brewer killing all his birds while Mr. Fulford scored 24, leaving Mr. Brewer—who also used a Greener gun—the winner of the shoot-off by a single bird.

One of the best scores on record is that of Captain A. H. Bogardus, who on July 2nd, 1880, succeeded in scoring 99 birds out of 100, the 47th bird falling dead out of bounds. This extraordinary score was made in a match with Mr. Rimmell, an English gentleman, for 250 dollars a-side. Bogardus, 30; Rimmell, 28 yards; 100 birds, 5 traps, weather fair, and birds in good condition.

In England Captain Bogardus never even approached the excellence of this score, his best recorded shooting being in a match with Mr. Dudley Ward, who shot a tie with him, each scoring 84 out of 100. Mr. Ward won in shooting off this match.

The match with Mr. Wallace, at the Gun Club Grounds, shot July 19th, 1878, resulted in a tie, each shooter scoring 69 birds out of 100. The following Wednesday the tie was shot off, resulting in a win for Mr. Wallace, he killing 71 birds to the captain's 69. On July the 23rd, in the same year, the captain shot a match with Mr. H. Cholmondeley-Pennell at the same grounds; the scores being—Captain Bogardus, 71; Mr. Cholmondeley-Pennell, 69. These scores are amongst the best ever made in England.

Dr. W. F. Carver, the celebrated rifle shot, was and is, an excellent performer with the shot gun. When in England in 1881 he shot off a series of matches of which the following are the best, as far as high scores are concerned:—

On March 16th, with Mr. W. Scott, 100 pigeons at 30 yards. Dr. Carver scored 79; Mr. Scott, 74. The longest string of consecutive kills was one by Mr. Scott, of 26. Both shots used guns by W. W. Greener.

Dr. Carver and Mr. Scott had previously (February 7th) shot a match at 100 birds, when the scores were:—Dr. Carver, 66; Mr. Scott, 62. The

birds were the finest and quickest seen during the winter, and the weather was vile, the greater part of the match being shot in a blinding snowstorm and a driving squall from the south-west.

In America in 1884 Dr. Carver shot a series of matches with Captain Bogardus. The following are the scores and distances:—First match (at Louisville, Ky. ; 100 birds, 30 yards rise, 80 yards boundary, Hurlingham rules) — Carver, 83 ; Bogardus, 82. Second match (at Chicago ; same conditions as first match)—Carver, 82 ; Bogardus, 79 ; at the 80th round scores were even, and remained so until the 90th, when Carver killed all succeeding birds, and won a well-contested match by 3 birds. Third match (at St. Louis ; 50 double rises at 21 yards)—Carver, 79 ; Bogardus, 81.

At Hendon, in March, 1881, Dr. Carver won the Championship of the World Challenge Cup, presented by the proprietors of *The Sportsman*, value £100, added to a sweepstakes of £50 each, and part of the gate money. There were 13 competitors, who fired at 50 pigeons each, 30 yards rise, usual conditions.

Dr. Carver made several matches with the best trap-shots of England. He was beaten once by Mr. Heygate, of The Gun Club, in a match of 25 birds a side.

Dr. Carver tied with Mr. A. J. Stuart-Wortley in a match for £500 a-side, shot at the Hendon Ground, December 8th, 1882 — score, 83 each

This match was the more exciting from the fact that at the 50th bird the scores were equal, as they were again several times during the last part of the match and at the finish.

Dr. Carver's string of 50 birds killed straight off, which he accomplished at Lynchburg, Va., U.S.A., with a Greener  $7\frac{1}{4}$  lbs. 12-bore gun, is his best on record in this line.

A final contest for the Championship of England Cup took place at Hendon on July 3rd, 1888, and resulted in a win for Captain Brewer, who killed 24 out of 25 birds, at 30 yards rise, and having thrice consecutively gained the prize against all comers, claimed the trophy as his own. Captain Brewer used a Greener gun in all contests.

In the contest for the American Field Champion Wing-Shot Cup, 1890, Mr. Elliott, the holder, successfully defended it with a Greener gun, scoring 59 out of 60, 48 out of 50, and 94 out of 100 birds.

In the celebrated three days' match between Mr. Elliott and Mr. Brewer, shot off at the Jersey City Heights Gun Club, both contestants used W. W. Greener's hammerless guns. The conditions were 100 birds each man each day; distance, 30 yards. The score was 93 each; the tie was shot off at 25 birds each, out of which Brewer killed 23 and Elliott 21. On the second day Mr. Brewer killed 69 straight off, the 70th fell dead out of bounds and finished with 30 kills—score: Brewer

99; Elliott, 92. On the third day, Brewer scored 93 and Elliott 89. This shooting is equal to the record score made by Captain Bogardus in 1880; and Captain Brewer has since, at a recent trial at Long Branch, killed 105 pigeons in succession.

Mr. J. A. R. Elliott is a brilliant and reliable shot, and has won ten times successively the American Field Champion Wing-Shot Cup, each time with a W. W. Greener gun.

The advantage of snap-shooting is clearly shown in the following extract from the *Forest and Stream*, of New York, of May 5th, 1891:—

“ELLIOTT *v.* FULFORD, for the American Field-Champion Wing-Shot Cup.—Mr. C. W. Budd, who umpired the match, sends us the score, with these comments by the local reporter:—

“Considering the day, the scores made by both shooters were remarkably good. The wind was blowing a perfect gale from the south-west, and once a bird got started from the traps and got up in the wind he went away like a streak of lightning.

“The difference in the style of the two men was in Elliott’s favour under these conditions. The Kansas City champion shoots very quickly, and thus was enabled to kill many birds close to the traps. Fulford, on the other hand, is rather a deliberate shot, and he made difficult birds out of a number of them by letting them get too far away.

“In the drawing of the birds the men had about equal luck, each getting about the same

number of drivers. The largest consecutive run was made by Elliott, who grassed his last 37 birds straight. The score shows that Elliott used his second barrel more frequently than did Fulford, but on a majority of the birds this was used simply for safety. There was a large attendance of shooting men, and the victory of Elliott was well received.

“Elliott shot his Greener, weighing 7 lb. 3 oz., and Fulford used his Hammer Greener, weighing 7 lb. 11 oz. Both men used Schultze powder in both barrels. Elliott, 46, winning the cup for the eighth time; Fulford, 43. Conditions—50 birds each, 30 yards rise.”

In December last the same gentlemen shot a series of matches of 100 birds each a side, for \$200 a match, a \$1,000 bet, and \$200 on a majority of the contests, usual conditions, 30 yards rise. The following were the scores made by each man: At Kansas City, Mo., Fulford, 86; Elliott, 85. At Indianapolis, Ind., Fulford, 96; Elliott, 93. At Pittsburg, Pa., Elliott, 93; Fulford, 90. At Williamsport, Pa., Fulford, 96; Elliott, 89. At Harrisburg, Pa., Fulford, 90; Elliott, 85. Of the 500 birds shot at in the five matches, Mr. Fulford scored 458, or  $91\frac{3}{8}$  per cent., and Mr. Elliott 445, or 89 per cent.

In these matches Mr. Elliott used a Greener gun, which has “Greener’s Steel” barrels, and, as the weather was extremely cold, during most of the time the thermometer being below zero it

proves that Steel Barrels can be used in frosty weather with perfect safety.

The greatest prize and highest honour ever shot for is the Championnat Universel, the one triennial event of the Monte Carlo International Meetings. This was won with a W. W. Greener gun, in 1886, by Mr. H. C. Pennell (who also won the Grand Prix du Casino in 1878 with his Greener gun), and again by Mr. W. Blake, in 1889, and it may interest some to know that neither of these shots was measured for his gun ; indeed, the gun used by Mr. Pennell was an ordinary weapon from stock, and a few hours before the match commenced the right or upright trigger was changed to act upon the left lock and *vice versa*.

The winners of the Grand Prix du Casino must also be considered amongst the best of trap shooters. This match is contested for by the best trap shots of all nations, and the birds are supplied by one of the most esteemed purveyors, whilst the Monaco boundary is acknowledged to be much in favour of the bird. The contest extending over several days also necessitates careful shooting over an extended period, and to kill 13 consecutive birds without a miss, firing only at long intervals, is evidence of the ability of the marksman.

In several instances the killing of a dozen pigeons in succession has taken the Grand Prix, as was the case in 1887 and 1888, and in 1891 Count Gajoli, with his Greener, killed his 5 birds at 26 and 5 at 27 metres.

The following gentlemen have won the Grand Prix du Casino :—

Year.	Winner of the Grand Prix.
1872—	Mr. George L. Lorillard (American).
1873—	Mr. J. Jee, V.C., C.B. (English).
1874—	Sir Wm. Call, Bart. (English).
1875—	Captain Aubrey Patton (English).
1876—	Captain Aubrey Patton (English).
1877—	Mr. W. Arundel Yeo (English).
1878—	Mr. H. Cholmondeley-Pennell (English).
1879—	Mr. E. R. G. Hopwood (English).
1880—	Comte Michel Esterhazy (Hungarian).
1881—	M. G. Camaueur (Belgian).
1882—	Comte de St. Quentin (French).
1883—	Mr. H. T. Roberts (English).
1884—	Le Comte de Caspela (Italian).
1885—	M. Leon de Dorlodot (Belgian).
1886—	Signor Guidicini (Italian).
1887—	Count Salina (Italian).
1888—	Mr. C. Seaton (English).
1889—	Mr. V. Dicks (English).
1890—	Signor Guidicini (Italian).
1891—	Count Gajoli (Italian).
1892—	Count Trautmannsdorf (Austrian).
1893—	Signor Guidicini (Italian).
1894—	Count Zichy (Austrian).
1895—	Signor Benevutti (Italian)

#### INANIMATE TARGETS.

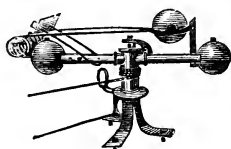
As a pastime the shooting at glass balls or bottles has long been practised in this country, but was developed and made a fashionable amusement in the United States by Mr. Ira Payne,



Captain Bogardus, Dr. Carver, and other professional shots.

The inanimate targets now in use may be divided into two distinct classes—balls and “pigeons.”

The balls, at first plain hollow spheres of colourless glass, were afterwards made of blue or amber glass, and filled with feathers; later the spheres were chequered to prevent the shot from glancing, and this stage of development is the highest reached by the glass ball. Balls made of various resinous compositions have been tried, and have a certain sale, but as there is difficulty in getting them suffi-



The “Carver” Revolving Trap.

ciently brittle they have not generally supplanted the glass balls. Other plans have been tried, as bell balls, puff balls, explosive balls, etc., but they have not proved successes commercially.

The traps to throw the balls have been wonderfully developed. From the modified catapult used at English fairs they have advanced to a rotating trap which simply defies trickery on the part of the trap puller or his assistants.

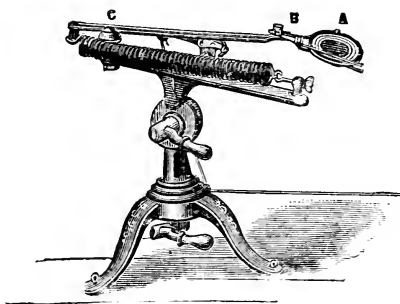
The "Hatch" was one of the first popular traps, it was followed by the "Bogardus" and the "Carver," which has a coil spring instead of a flat one. The "Mole" was an early rotating trap; the card was an improvement upon it, and the modern rotating trap is a close copy of its most approved pattern.

The Ligowsky clay pigeon trap was the next improvement in the way of an inanimate flying target; the trap now much improved, and pigeons also perfected, are still on sale.

Instead of "glass balls" or "clay" pigeons, the broken fragments of which are objectionable on lawns and in parks, thin brass balls or pigeons filled with fine powdered charcoal may be obtained; when fairly struck they emit an unmistakable cloud of dust, and the worn-out targets are readily collected. Inanimate targets made of a composition of resin and plaster, coal tar, and ashes, or other suitable materials worked up until thoroughly incorporated and moulded under great pressure, are now largely used; they fly well, break easily when struck, and are so coloured as to be visible against any background.

Good traps such as the "Standard," "Keystone," "Blue Rock," or "Peoria," will throw these targets so well as to afford excellent practice even to good shots. Nothing affords so much amusement with the gun at a small cost, and as a pastime it may be strongly recommended to all who are fond of snap-

shooting. The trap recommended is so constructed that it imparts to the thrown target a high rotary motion, and at the same time throws it with little friction. The trap also so throws the target that it has a steady flight and a good velocity, which is



The Blue Rock Trap.

not perceptibly greater at the commencement than at the end of the flight.

There are certain accessories necessary, such as cords, planks, and holding-down pins, and clubs will also provide themselves with pulling gear; and whether using three or five traps, will decide upon a definite method of determining in which order the traps shall be sprung. The use of dice or a trap-pulling indicator will effectually prevent collusion between the shooter and puller.

The following rules are those generally observed in inanimate target shooting, and with little or no

alteration may be applied to matches with any number of traps.

RULES FOR INANIMATE TARGET SHOOTING.

1. DECISION OF JUDGES.—Two judges and a referee shall be appointed to judge all matches. If the judges cannot agree, the referee shall decide, and his decision shall be final.
2. SPECIAL DUTIES OF REFEREE.—The referee shall see that the traps are properly set at the beginning of a match, and that they are kept in order to the finish.
3. FLAGS FOR JUDGES.—Each judge shall be provided with a red flag and a white flag. They shall raise the red flag to indicate a “broken” bird, and the white flag to indicate “lost” bird; they shall raise both flags to indicate “no bird” or an imperfect bird; they shall also announce the score in a loud voice.
4. KEEPING THE SCORE.—It shall be optional with the judges and referee to keep the score themselves, or appoint some one for that purpose, and the score thus kept shall be the official score, provided, however, that the referee must testify to the correctness of the score or scores made under his supervision, if required.
5. SCORE WITH INK.—All scoring shall be done with ink or indelible pencil; the scoring of a lost bird shall be indicated by a “0;” of a dead or broken bird by a “1.”
6. TRAPS.—All matches shall be shot from three traps set level, in the segment of a circle 5 yards apart. The radius of this circle shall be 18 yards. The traps shall be numbered from No. 1 on the left to No. 3 on the right consecutively. All traps must throw the birds a distance of not less than 40 yards.

Each trap must be tested for this standard distance before the shooting begins, and if any trap be found too weak to throw the required distance, a new trap or spring must be substituted.

7. ADJUSTING TRAPS.—The lever or projecting arm of the trap shall be so adjusted that the elevation of the bird in its flight at a distance of 10 yards from the trap shall not be more than 8 feet nor less than 4 feet, and the angles of flight shall be as follows:—

No. 1 trap shall be set to throw a left quartering bird.

No. 2 trap shall be set to throw a straight-away bird.

No. 3 trap shall be set to throw a right quartering bird.

After the traps are set for the above angles, if the bird for any reason shall take a different angle, it shall be considered a fair bird, provided the trap has not been changed.

8. PULLING OF TRAPS.—The trap-puller shall stand at least 6 feet behind the shooter, and when the shooter calls "Pull," the trap or traps shall be instantly sprung. In single bird shooting he should pull the traps indiscriminately, and not one, two, and three consecutively. He shall pull equally and regularly for all shooters. If the bird is sprung before or at any noticeable interval after the shooter calls "Pull," he can accept the bird or not, but if he shoots the result shall be scored.

- 9.—SCREENS.—No screens shall be used. Back-stops may be provided for trappers, not to exceed 10 yards from the end traps, and not to exceed 3 feet in height.

- 10.—DISTANCE.—In single bird shooting the rise shall be 18 yards for 10-bore guns, 16 yards for 12-bore guns. In double bird shooting the rise shall be 15 yards for 10-bore guns, 14 yards for 12-bore guns.

All distances mentioned in these rules must be accurate measurement.

- 11.—GUN.—No gun of larger calibre than 10-bore shall be used.
- 12.—LOADING GUNS.—In single bird shooting only one barrel shall be loaded at a time, and the cartridge shall not be placed in the barrel until after the shooter has taken his position at the score ; in double bird shooting both barrels to be loaded at the score.
- 13.—POSITION OF GUN.—The butt of the gun shall be held below the armpit until the shooter calls "Pull." If this rule be violated, and the bird is missed, it shall be scored as a "lost bird." If it be broken, it shall be declared "no bird," and another shall be shot at.
14. BROKEN BIRDS.—A bird to be scored broken must have a perceptible piece broken from it while in the air. The decision of the judges and referee on this point shall be final. No bird shall be retrieved to be examined for shot marks.
- If a bird be broken by the trap the shooter may claim another bird, but if he shoots, the result must be scored.
15. SINGLE BIRD SHOOTING.—Each contestant shall shoot at three birds before leaving the score. If two birds are sprung at the same time, it shall be declared "no bird."
16. DOUBLE BIRD SHOOTING.—Both traps must be pulled simultaneously, and each contestant shall shoot at three pairs consecutively, thrown as follows :—
- First pair from No. 1 and 2 traps. Second pair from No. 2 and 3 traps, and third pair from No. 1 and 3 traps. If only one bird is thrown it shall be declared "no birds," and if the gun miss fire on either bird it shall be declared "no birds." In each and all such cases another pair of birds must be shot at.
- 17.—TIE SHOOTING.—All ties shall be shot off at the original distance, and at the number of birds agreed on by the contestants. If, however, the contestants

cannot agree promptly on this point, the referee shall fix the number, and his decision shall be final. The rules prescribed for single and double bird shooting shall prevail in tie shooting.

- 18.—CHALLENGE.—No challenge shall be considered unless the parties challenging are contestants.

#### THE BEST RECORDS.

The best records made at inanimate targets are very much higher than anything obtained from live bird shooting. According to a list recently published there are more than a dozen shooters in the United States who have broken 100 of the inanimate targets without a miss, and the score made and recorded at a public competition. Upwards of fifty shooters have scored more than 90 out of 100.

“Young Nimrod,” an English boy, has, with his 28-bore gun and  $\frac{3}{4}$  oz. of shot, frequently scored 88-100 at clay pigeons.

In a series of twenty-five matches, at 100 clay pigeons each at each match, between Dr. Carver and Capt. Bogardus, 2,227 were broken by Dr. Carver, and 2,103 by Capt. Bogardus, at 18 yards rise. Dr. Carver made two scores of 100 each without a miss, and won nineteen matches, tied in three, and lost three. His lowest score was the first—72; and twenty of his scores exceeded 90 broken. Capt. Bogardus once scored 99, his highest, and three times 63, his lowest in this series of matches.

At glass balls still less skill is required ; but the best record is Mr. Scott's — 700 smashed consecutively with a Greener gun. Dr. Carver, in a match with Mr. Scott, broke 9,737 out of 9,950 shot at ; Mr. Scott, 9,735 out of the same number. Out of the last 950 in this match Dr. Carver missed two only, and Mr. Scott three.

The quickest time recorded for breaking 100 glass balls with a shot gun is just under five minutes. Capt. H. Bogardus, the great American wing shot, made a match against time in December, 1879, and succeeded in breaking 5,500 glass balls in a few seconds less than 7 hours 20 minutes. The misses numbered 356. The captain used an English gun with two pairs of barrels—one pair (10-bore) shooting 4 drams of powder and  $1\frac{1}{2}$  oz. of No. 8 shot ; the 12-bore pair were loaded with  $3\frac{1}{2}$  drams 1 oz. of No. 8 shot. During the match the captain loaded for himself, and changed the barrels no less than fifty-five times. Three miss-fires only occurred in the whole series of 5,855 shots. The balls were all sprung from spring traps.

At a gun trial held at Leavenworth in 1886, a Greener 12-bore gun was shot with "King's Quick Shot" powder, an explosive the author has never had an opportunity of trying. The gun beat all its opponents easily—some were much heavier guns and larger calibre.

#### HOW EXPERTS SHOOT.

The most skilled exponents of the art of wing



shooting should be able to give some hints of value to all who wish to become expert in the use of the shot gun. The author having unique opportunities for acquiring a knowledge of the methods followed by professional trap shots in aiming and handling the gun, is enabled to give a few facts which prove how diverse are the modes of unerring shots, and how different the advice which would be given by various successful shooters. Dr. Carver shoots on the snap-shot system, shooting both barrels in quick succession *at* the pigeon. Captain Brewer shoots *at* some pigeons, and holds ahead of others determining which to do immediately the bird is released from the trap. Mr. J. A. R. Elliott, than whom there is, perhaps, no better or steadier all-round trap shot, also follows the dual plan. He shoots on both systems most successfully, and is able to change his methods of shooting from one pigeon to the next. He appears to shoot most rapidly, but is in reality a most deliberate shot, judging every bird the instant it takes wing, shooting slowly at a slow-flying bird, and very quickly, and with both barrels, when a quick-flying bird is released. With quartering birds, that is at cross shots, it is his invariable plan to hold ahead of them, estimating the angle in which and the rate at which they are flying, and leading them from six inches to two feet with the first barrel, and from two feet to six feet with the second. This ability of accurately judging the flight of birds and

the allowance necessary to grass them won him the match at fifty birds with Mr. Fulford. The wind was high at the commencement, and developed into a stiff gale during the match, and blowing irregularly made it almost impossible to gauge accurately what wind allowance should be made. The first dozen birds were shot at with a light gun, with a charge of  $3\frac{1}{2}$  drams of Schultze, and  $1\frac{1}{4}$  oz. of No. 6 shot; at the fourteenth bird a heavier gun was taken and No. 5 shot used. The match finished with thirty-seven killed straight, the score being 46-50 to Mr. Fulford's 43-50. With the second gun and heavy shot Mr. Elliott shot very rapidly, catching his birds as near the trap as possible, and using both barrels.

Mr. Fulford, whose score of 194 grassed in succession has never been approached, holds ahead of his birds. Having ascertained by actual experiment that at forty yards his shot was stringing from twenty to thirty feet, he took that margin in shooting, and found that whether holding a little high or a little low he still killed the pigeon clean, providing that he held eight to ten feet ahead of a bird going across.

The great stringing of the charge is due to the heavy charge of explosive used. The average stringing in a properly loaded gun is about ten feet at forty yards; this is equal to a drop in the mean velocity from 900 feet per second (the velocity of the first pellets of the charge) to 650 per

TABLES OF THE PATTERNS MADE BY THE BEST GUNS IN THE LONDON GUN TRIALS OF 1859, 1866, 1875, 1878, 1879, AND THE AMERICAN GUN TRIALS OF 1873, 1874, 1879.

	Bore.	drams.	oz.	shot.		Pattern.	
						Right.	Left.
<b>LONDON GUN TRIAL, 1859—</b>							
Muzzle-loader ... ..	12			$2\frac{3}{4} \times 1\frac{1}{4}$ No. 6	290 pellets to oz.	158	118
Breech-loader ... ..	12			$3 \times 1\frac{1}{4}$ No. 6		144	90
<b>LONDON GUN TRIAL, 1866—</b>							
Breech-loader ... ..	12			$2 \times 1\frac{1}{8}$ No. 6	280 pellets to oz.	131	123
Breech-loader ... ..	16			$2\frac{1}{2} \times 1$ No. 5		100	118
<b>LONDON GUN TRIAL, 1875—</b>							
*Breech-loader ... ..	12			$3\frac{1}{4} \times 1\frac{1}{8}$ No. 6	270 pellets to oz.	Average.	
*Breech-loader ... ..	10			$4 \times 1\frac{1}{2}$ No. 6		214	
*Breech-loader ... ..	20			$2\frac{1}{2} \times 1$ No. 6		241	
*Breech-loader ... ..	8			$6 \times 2\frac{1}{2}$ No. 6		145	
						358	
<b>LONDON GUN TRIAL OF EXPLOSIVES, 1873—</b>							
Breech-loader ... ..	12			$3\frac{1}{4} \times 1\frac{1}{8}$ No. 6		220	08
<b>LONDON GUN TRIAL, 1879—</b>							
Breech-loader ... ..	12			$3\frac{1}{4} \times 1\frac{1}{8}$ No. 6	Chilled shot. 270 pellets to oz.	223	
Breech-loader ... ..	16			$2\frac{3}{4} \times 1$ No. 6		174	
Breech-loader ... ..	23			$2\frac{1}{4} \times \frac{7}{8}$ No. 6		174	
<b>NEW YORK GUN TRIAL, 1873—</b>							
Breech-loader ... ..	12			$3 \times 1\frac{1}{8}$ No. 6	Shot with paper shell	150	
Breech-loader ... ..	12			$3\frac{1}{2} \times 1\frac{1}{8}$ No. 6	Shot with metal shell	211	
Breech-loader ... ..	10			$4\frac{1}{2} \times 1\frac{1}{4}$ No. 6	Shot with paper shell	211	
<b>CHICAGO GUN TRIAL, 1874—</b>							
Breech-loader ... ..	12			$4 \times 1$ No. 7	309 pellets to oz.	180	
Breech-loader ... ..	10			$4\frac{1}{2} \times 1$ No. 7		191	
<b>CHICAGO GUN TRIAL, 1879—</b>							
Breech-loader ... ..	12			$3\frac{1}{2} \times 1\frac{1}{8}$ —	291 pellets to oz.	170	
Breech-loader ... ..	10			$4 \times 1\frac{1}{4}$ —		200	
Breech-loader ... ..	16			$2\frac{1}{2} \times 1$ —		163	
Breech-loader ... ..	20			$2\frac{1}{2} \times 1$ —		138	

\* These four guns were shot in the selected circle, and with chilled shot.

second (the velocity of the last pellets of the charge).

The swiftest flying pigeon travels at about one-third the rate of a charge of shot at thirty yards, and whilst theoretically it is correct to lead a quartering pigeon from five to seven feet, there are few trap shots who do it.

#### LONG SHOTS.

The extracts from a few letters received by the author will best serve as instances of exceptionally long shots which have recently been made. One sportsman, writing from Canada, says:—

“Since I have had my Treble-Wedge-Fast 12-bore hammerless gun, 28 inches long,  $7\frac{1}{2}$  lbs. weight, forty guinea quality, made by you in 1880, I have made many exceptionally long shots in duck-shooting.

“In the month of October this fall, however, I made three shots which, in justice to you, are deserving of especial mention. On the occasion in question my gun, which is full choke in both barrels, was charged with  $3\frac{1}{2}$  drs. of Curtiss and Harvey's No. 4 powder, with one felt and two cardboard wads between powder and shot, and  $1\frac{1}{8}$  oz. of No. 2 chilled shot with cardboard wads.

“With the first shot I killed two black ducks crossing on the wing at 75 yards, with the second a single blue bill (small duck) sitting at 100 yards, and with the third a single black duck sitting at

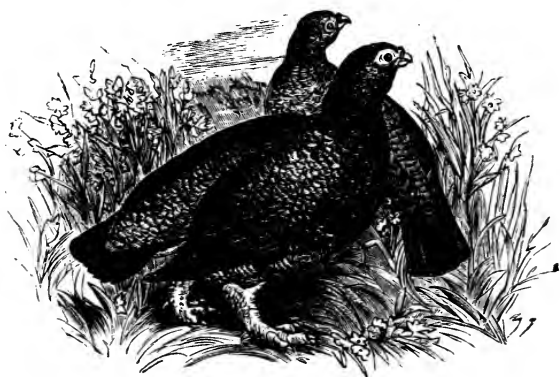
fully 110 yards. When the length and weight of my gun, and the moderate charge of powder, and the large size of the shot used, are taken into consideration, I think the three shots in question, which were all fired one after the other within an hour's time, are worthy of ranking as extraordinary shots."

From another gentleman the author has just received the following:—

"Mr. W. W. Greener,  
"Birmingham.

"DEAR SIR,—The little 16-bore Ejector gun I ordered came to hand, and I have had a good opportunity of testing it, and must say I am very much pleased with it.

"I killed some geese at 50 to 55 yards with it, using 3 drs. E.C. and 1 oz. No. 1 shot, but of course it is not a goose gun."—F. G. S., *May 17th*, 1892.



*Extract from a letter to THE FIELD,*

*December 9th, 1876.*

“In the third week in November I went out partridge shooting in Yorkshire (birds, as every one knows, are as wild as hawks at this season of the year). Accompanying me were two gentlemen, both quite first-rate shots. All



three of us had equal chances throughout the day. At the end of it one of my friends had seven brace, the other six brace, but the choke had sixteen and a half brace. I advisedly say the ‘choke,’ because I was fully convinced that the gun alone was the cause of my overtopping my friends by so large a number. I measured that day three successive shots—65, 71, and 62 yards! In my honest opinion, I look upon the full choke-bore as the

greatest and most wonderful improvement ever made in a gun, and I prophesy in a few years we shall hear but little of the old style of boring.

“FREDERICK A. MILBANK.

“Wemmergill Lodge.”

*From THE FIELD, December 23rd, 1876.*

“I can now further state that I have tried it at ‘very hot corners’ at pheasants, and I defy any one, after a day’s shooting, to point out a single bird that has been ‘blown.’ My experience has proved beyond doubt that the choke-bore does not blow pheasants or any other game to pieces at 20 yards.

“FREDERICK A. MILBANK.

“Wemmergill Lodge.”

## Part II.

## NOTES ON RIFLES.



## CHAPTER X.

## RIFLES OF THE PAST AND PRESENT.

THE INVENTION OF RIFLING—THE BROWN BESS—THE BRUNSWICK—THE JACOBS—W. GREENER'S EXPANSIVE RIFLE BULLETS—THE MINIÉ RIFLE—THE ENFIELD—THE WHITWORTH—THE HENRY—THE METFORD—THE LEE-SPEED—TUBULAR BULLETS.

MOST writers assign the invention of spiral-grooved arms to Gaspard Kollner, gunmaker, of Vienna, in the year 1498, though others state that his barrels had straight grooves, and that he first applied the system to arms for target practice at Leipzig. Other writers attribute the invention to Augustus Kotter, of Nuremburg, 1500 to 1520; but, however that may be, all seem agreed that the honour of the invention is due to the Germans.

Firearms were introduced into the British Army in the year 1471, and from that date until the Commonwealth were on the matchlock principle.

During the reign of James I. a few of the leading regiments were armed with the flint lock. In the reign of William III. it came into general



use, and from it was developed the renowned Brown Bess, which, for a century and a half, was the regulation arm of the British Forces.

The Brown Bess weighed 11 lbs. 2 ozs.; the barrel was 3 feet 6 inches, and of .753 bore or 11 gauge. The bullet was two sizes smaller than the bore, and was wrapped up in a loosely-fitting patch, which formed a cartridge. The service charge was  $4\frac{1}{2}$  drachms of powder, and a bullet of 490 grains. She was easy to load even when foul, and, beyond her rude lock, there was little mechanism to get out of order.

The old Muzzle-loading rifle employed in connection with a tightly-fitting ball, never was and never could be employed by troops generally, the force required to push home the bullet rendering its use as a weapon of war impossible.

After the French wars the chief military Powers of Europe found the plan of loading a rifle to be so intolerable that the English, French and Prussian authorities each determined, almost at the same time, to set themselves the problem of discovering an efficient substitute.

The Brunswick Rifle was shortly afterwards produced. In this arm the grooves were reduced to two, and a belted ball was used. The projecting belt enabled the bullet to catch the channel instantly and—when wrapped in a greased patch—to descend easily, without the necessity of hammering. The length of the barrel was 33 inches, and

the bore .704 or 13 gauge, and the weight 11 lbs. 5 ozs.

The labour of loading was greatly diminished, and any charge of powder could be used without fear of stripping the bullet, which was a very frequent occurrence under the old system of rifling.

The shape of the projectile, however, was ill-adapted for cleaving the air; on first emerging the belted side went foremost, but quickly obeying the ordinary laws it revolved on its shorter axis, presenting its larger area or flat side to the air.

To equalise this in some measure Brigadier-General Jacobs (to whom the scientific world is deeply indebted for the zeal and energy he displayed in carrying out such extensive and costly experiments) invented the four-grooved rifle and bullet. The bullet had two bands cast upon it at right angles to each other, and was found to give greater range and accuracy.

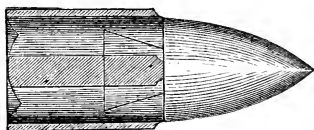
General Jacobs offered this invention to the Indian Government in the year 1846, by whom it was rejected with the plea that "The Brunswick being considered good enough for the British Army, was good enough for service in the Honourable East India Company."

Notwithstanding this rebuff the gallant officer continued his experiments with the object of discovering the best kind of bullets to be used in the rifle which he had invented, as he found that

the globular ball could not be depended upon beyond 300 to 350 yards.

After numerous experiments—many of which were attended with curious results—a conical ball with a globular spheroidal base and heavier than the former bullet was adopted, and which gave excellent shooting at 600 and 800 yards.

Soon after this invention the Minié bullet was introduced ; General Jacobs immediately set himself the task of improving upon it, and succeeded in



The Jacobs Bullet.

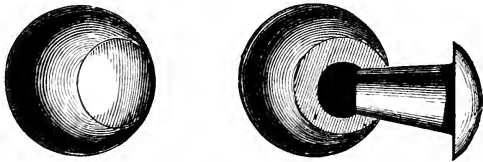
producing a projectile of the form illustrated. It contained a charge of powder in a copper tube, the front of which was primed with detonating powder and exploded upon impact.

Explosive shells were invented long before this time, Captain Norton having successfully experimented with them as far back as 1823.

The principal outcome of General Jacobs' elaborate trials and experiments was a double-barrel 32-bore four-grooved rifle, deep grooves  $\frac{3}{8}$  turn in 24 inches, which was sighted up to 2,000 yards, with leaf and tangent sight, and also the projectiles before mentioned.

In 1836 the late W. Greener produced the first

perfect expansive bullet. It consisted of an oval ball, a diameter and a half in length, and had a flat side, also a perforation extending nearly through it, a cast metallic taper plug with a head like a round-topped button. The end of the plug being slightly inserted in the perforation, the ball was put into the rifle either end foremost, and upon the explosion taking place the plug was driven home, and the bullet expanding filled up the grooves of the rifling and prevented windage.



W. Greener's Expanding Bullet.

A trial was made of this invention in August, 1835, at Tynemouth, under the command of Major Walcot, R.H.A., and a party of the 60th Rifles, when the success of the experiments far surpassed the expectations of the military men present.

It was then proved that with Greener's expanding bullets, rifles could be loaded as easily as smooth-bore muskets.

Fifty charges with Greener bullets were fired into a sandbank, and upon recovery the balls were found to bear the impress of the grooves of the

rifle, thus proving that the expansion of the bullet actually took place.

The report of this trial, submitted to the Board of Ordnance by Major Walcot, although very favourable, received very little consideration by the authorities at Woolwich.

It was rejected by them, simply because the Government was not at that time prepared to adopt a new weapon for the British Army, and not for the reason stated by the Secretary of the Board. It is believed that out of consideration for the Duke of Wellington, who was hostile to change in matters of military equipment, and who was wilfully blind to the defects of the old musket, this wonderful invention was passed over practically unnoticed. This seems to be proven by the fact that a new weapon was adopted soon after the death of the Duke in the year 1852. The rifle in question was the Minié rifle and system of bullet, for which the inventor, Captain Minié, of the French army, received £20,000 from the British Government, although they had years before refused the same principle exactly when offered to them by Mr. W. Greener, in 1842. Mr. Greener, under command of the Board of Ordnance, constructed model arms for trial. They were rejected by the Select Committee at Woolwich, whose power was superior to that of the Master-General, though he was fully pledged to afford Mr. Greener a second trial.

During the succeeding years Mr. Greener made several unsuccessful attempts to obtain from the British Government some recognition of his claims to the invention, and not until Mr. Scholefield, the member for Birmingham, moved in the House of Commons for copies of the correspondence between the Board of Ordnance and Mr. Greener, and the papers connected therewith, was this act of injustice truly exposed. Eventually the Government, after much trouble, admitted Mr. Greener's priority, and awarded him £1,000 in the army estimates of 1857.

Mr. Greener stated in his work, "Gunnery in" "1858," that there is no evidence that either "Delvigne or Minié had any profound knowledge" "of the science of gunnery; and their knowledge" "of the principles of expansive rifle bullets were" "so meagre as to justify the assumption that their" "only connection with its production was that of" "copying from the *Times*, or from my works," "published in 1842 and 1846."

The Minié rifle was .702 bore, or between 13 and 14 gauge, and had 4 grooves, one turn in 6 ft. 6 in., firing a projectile weighing 680 grains, which had a hollow base into which an iron plug was driven by the force of the explosion, and thus expanding filled into the grooves of the rifling.

About 28,000 of these arms were made, and supplied to a certain proportion of nearly all the regiments of the army. It was not, however, a

success, on account of its great tendency to fouling, and also the strength of the sides of the projectile not being well adjusted, the iron plug was occasionally driven right through the bullet, converting it into a hollow leaden cylinder, a portion of which would remain in the barrel.

A modification of the "Greener-Minié" principle was afterwards adopted by the Government, the bore was reduced to '577,\* or 24-bore, and the rifle weighed 8 to 9 lbs.

It will be noted that this was about half the bore of the old Brown Bess.

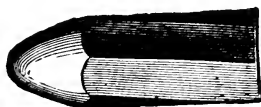
It was a combination of several systems submitted to the Government by the following gun-makers, who expected to have their rifles adopted *in toto*:—Purdey, Westley Richards, Lancaster, Wilkinson, and Greener.

The Government made use of the good points of each, and constructed a new model at their own works at Enfield, from whence it derives its name. The rifling was 3 grooves and 1 turn in 6 ft. 6 in. ; the barrel 3 ft. 3 in., and the available range 1,100 yards. A new model was introduced shortly afterwards known as the short Enfield. It had a barrel 2 ft. 9 in., with five-groove rifling, 1 turn in 4 ft. 6 in. A great number of Enfield rifles were

\* At this time the bore of a rifle was given in decimals of an inch, instead of as previously by the number of spherical balls to the pound ; the latter system has, however, been retained in connection with shot-guns.

afterwards converted into breech-loaders on the Snider system.

Mr. Whitworth, at the cost of the British Government, next produced his hexagonal rifle with a bore of  $\cdot450$  inch, or 52 gauge. The extreme length of the projectile, and the quickness of the spiral, was considered a great marvel at the time. The bullet is shown in the illustration; it weighs 530 grains, and is  $1\frac{3}{8}$  inch in length; it is also hexagonal. The barrel is formed like a female screw, completing one turn in 20 inches, or two



The Whitworth Bullet.

turns in the barrel of 3 ft. 4 inches; it is hexagonal with its largest diameter—that is, from angle to angle  $\cdot500$  inch; the diameter from side to side  $\cdot450$  inch.

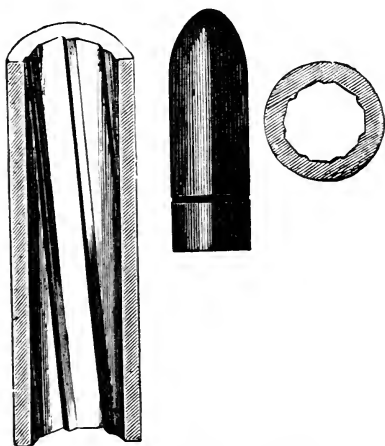
The objections raised to the rifle were numerous, but the experiments and the production of the system will always be regarded as of great scientific value.

The demand for a breech-loader, in consequence of the great success of the Prussian needle gun, excluded its adoption for the army. Mr. Whitworth's experiments proved the greater accuracy



the .450 bullet possessed over those of larger diameter.

The Henry rifling which next appeared was a modification of the Whitworth system applied to a breech-loader. In conjunction with the Martini breech action, it has done and is still doing good service at both target and game. The bore is .450 ;



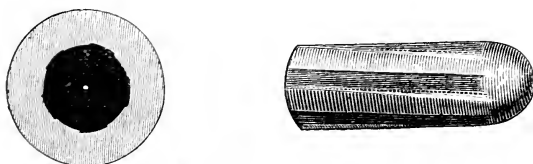
The Henry Rifling and Bullet.

weight of bullet, 480 grains ; powder charge, 85 grains. The barrel is 33 inches and has a spiral of one turn in 22 inches. It is accurate up to 800 yards, but its actual range is considerably beyond this distance.

For match shooting the Metford system surpassed the Henry for accuracy at long ranges.

Exceptionally good diagrams have been made at 1,000 yards and even beyond.

In the Figs. the Metford rifling and bullet are shown ; the grooves, five in number, are very wide, and barely 4000ths of an inch deep. The military pattern grooves are more rounded, seven in number and slightly deeper, so as to be more lasting. Both styles of grooving scarcely alter the shape of the bullet, as will be seen by the illustration



The Metford Rifling and Bullet.

which represents a bullet fired from a Metford match barrel 34 inches in length.

The grooves of the rifling are of uniform depth and on an irregularly accelerating spiral, there being a little over a complete turn in the length of the barrel although the spiral finishes at the muzzle at the rate of one turn in 17 inches.

The Lee-Speed magazine lately adopted by our Government is of American invention with certain modifications made by Mr. Speed at Enfield.

The infantry arm weighs 9 lbs. 8 oz. The rifling is on the Metford system, having seven grooves with one turn in 10 inches against one in 22 with the Martini, whilst the barrel is three inches

shorter, being only 30 inches long. The magazine is  $3\frac{1}{4} \times 2$  inches, and holds 10 cartridges; a "cut-off" of the simplest description, in the shoe of the rifle, blocks the exit of the magazine and converts the weapon into a single-shot arm.

The rifle and bullets are illustrated in the chapters on sporting rifles, where also further particulars of the range, etc., are given.

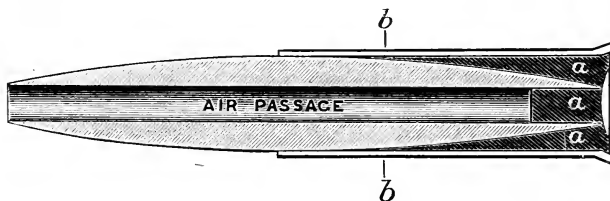
The rifles of the future, we think, will be still further reduced in bore and the bullets of tubular form.

The following extract is taken from *The Field* of February 3rd, 1894, and gives an account of the latest improvements in this direction.

#### TUBULAR BULLETS.

*The Field*, February 3rd, 1894.

"SIR,—If the reports of the recent experiments in Germany with the Krnka-Hebler bullet,



The Krnka-Hebler Tubular Bullet.

mentioned in "Arms and Explosives," are to be relied upon, there is likely to be a wonderful

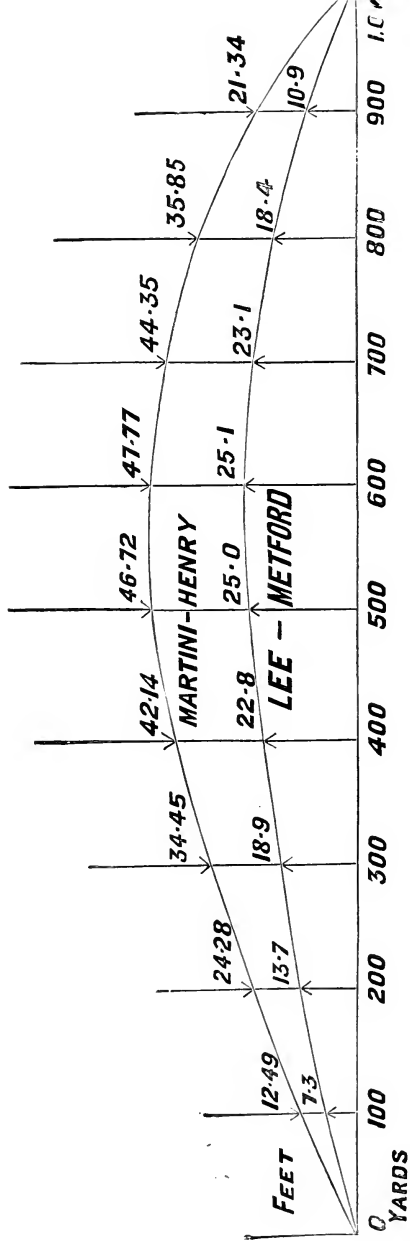


DIAGRAM OF COMPARATIVE TRAJECTORIES OF THE MARTINI-HENRY AND THE LEE-METFORD RIFLES.

TRAJECTORY OF LEE-METFORD 303 WITH CORDITE AMMUNITION HAVING 2,000 F.S.M.V.

Range in Yards.	Height of Trajectory in Feet above Line of Sight.												
	100	200	300	400	500	600	700	800	900	1,000	1,100	1,200	1,300
200	0'4												
300	1'0	1'1											
400	1'6	2'3	1'8										
500	2'3	3'7	3'9	2'8									
600	3'1	5'3	6'4	6'0	4'0								
700	4'0	7'1	9'0	9'6	8'5	5'3							
800	5'0	9'1	12'0	13'5	13'4	11'3	7'0						
900	6'1	11'3	15'3	17'9	19'9	17'9	14'6	8'7					
1,000	7'3	13'7	18'9	22'8	25'0	25'1	23'1	18'4	10'9				
1,100	8'6	16'3	22'9	28'0	31'5	33'0	32'3	28'9	22'7	13'1			
1,200	10'0	19'2	27'2	33'8	38'7	41'6	42'3	40'4	35'7	27'5	15'8		
1,300	11'6	22'3	31'8	40'0	46'5	51'0	53'2	52'9	49'6	43'0	32'9	18'6	0

TRAJECTORIES OF MARTINI-HENRY 450.

Range in Yards.	Height of Trajectory in Feet above Line of Sight.											
	450	500	600	700	800	900	1,000	1,100	1,200	1,300		
500	3'570	0										
600	11'06	8'492	0									
700	18'85	17'32	11'00	0								
800	27'02	26'59	22'56	13'93	0							
900	35'72	36'43	34'85	28'76	17'48	0						
1,000	44'83	46'77	44'28	44'28	35'80	21'27	0					
1,100	54'44	57'66	61'31	60'64	55'11	43'71	25'71	0				
1,200	64'71	69'26	75'80	78'11	75'71	67'66	53'14	31'11	0			
1,300	75'37	81'39	90'93	96'34	97'21	92'60	81'74	63'52	36'54	0		

NOTE.—The height approximating most closely to the "culminating point" of each trajectory is printed in larger type.

improvement in small arms in the near future. The bullet, which is said to be suitable for all rifles of the modern long-range, small-bore type, is torpedo or cigar shaped, and is of about six diameters in length. A tubular passage of *about* one-third of the diameter of the projectile allows the air to pass through the bullet, and this, together with its tapering ends, diminishes the resistance of the air to a very great extent, and leaves little or no vacuum behind it. The bullet is made in two patterns: in one, it is cased externally with steel; in the other, the air passage is lined with that metal to give it stability. A wad, or sabot, of paper centres the bullet and keeps it steady in its passage up the bore; it also takes the force of the explosion. A cylindrical metal ring or guide-roll, fixed on the bullet, takes the rifling.

“The sabot parts company from the bullet when the latter leaves the muzzle of the rifle.

“In the experiments above alluded to, the following results were obtained with the bullet in a 5 mm. or .196-bore Hebler rifle—

Distance in Yards.	Velocity in ft. sec.	Penetration in inches in deal.
0	2966	33'14
547	2769	34'45
1094	2585	34'78
1640	2417	34'12
2187	2257	33'14
2734	2106	30'84

“These results show to what a wonderful extent the tubular bullet overcomes the resistance of the air, the remaining velocity at 2,700 yards being about three times as great as that of most long-range small-bore bullets at that distance, while the trajectory is so flattened that it may be possible to use one sight for all distances up to 1,000 or 1,200 yards on a military weapon.

“There appears to be no reason why this invention should not be applied to sporting arms. It would greatly increase their effectiveness, especially as regards flatness of trajectory, and the tubular bullet would probably act very much like the express hollow-pointed one in its effect on game. “B.”

## CHAPTER XI.

## THE SPORTING RIFLE.

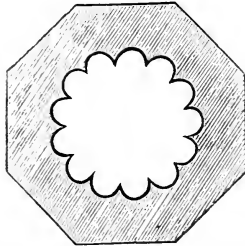
EARLY LARGE BORES—SIR SAMUEL BAKER'S RIFLE—FORSYTH'S RIFLE—THE ORIGIN OF THE EXPRESS — THE '303 LONG - RANGE EXPRESS—TABLES OF WEIGHTS AND LENGTHS OF DOUBLE RIFLES — CARTRIDGES FOR EXPRESS, LONG RANGE, AND ROOK RIFLES—ACCURACY AND RANGE OF SPORTING RIFLES — VELOCITIES — ENERGY — PENETRATION — BULLETS—SINGLE RIFLES—COMBINED RIFLE AND SHOT GUNS—CHOKE-BORE RIFLE—RIFLE POWDERS—LARGE BORES—CHOICE OF A SPORTING RIFLE—SIGHTS—ROOK AND RABBIT RIFLES.

PRIOR to the year 1845 smooth-bore guns of either 14 or 16-calibre were the favourite weapons for elephant and large game shooting in Ceylon.

The rifles then used were usually of 16-bore, and fired a charge of  $1\frac{1}{2}$  drachms only of powder, with a 1-ounce spherical ball. The sights were adjusted up to 200 yards; fair accuracy could be obtained at known ranges with such weapons, but it was difficult to hit at unmeasured distances, since the trajectory was very high, owing to the



low velocity given to the bullet by so small a charge of powder. The penetration and striking energy were weak ; for these reasons smooth-bores were preferred, which, when loaded with a double charge of powder (6 drachms), and firing the 1-ounce hardened spherical bullet, gave a very high velocity, and consequently a flat trajectory



Polygroove Rifling, as used for Muzzle-loaders.

and great penetration, although the accuracy beyond fifty yards was imperfect.

The late Sir Samuel Baker seems to have been the first to introduce into Ceylon the large-bore rifle.

In 1840 he drew up a plan for an experimental rifle to burn large charges of powder, in order to get a high velocity, low trajectory, and great power. The plan was successfully carried out by Mr. Gibbs, of Bristol, who produced a rifle weighing 21 lbs., to fire a charge of 16 drachms with a 3-ounce spherical or 4-ounce conical bullet. The barrel was 36 inches long, with rifling exceedingly deep, two broad grooves having one turn in the

length of the barrel. Twelve months afterwards his experiences in Ceylon elephant shooting decided him to order a battery of double-barrel 10-bores constructed on the same principle.

According to Captain Forsyth and other authorities, there was not a good rifle suitable for sporting purposes in India known up to 1860.

The long-range rifles, such as the Enfield or Jacobs, were not adapted for game shooting, on account of the high trajectory and lack of striking force, so even at this time smooth-bores were still preferred for large game, on account of their long-point blank range when loaded with heavy charges. The great fault of the rifles made for spherical ball up to this time was in the style of rifling. The spiral of the grooving was much too rapid, and caused the bullet to strip when using heavy charges of powder.

Captain Forsyth, after careful study of the subject, concluded that one turn in ten feet was ample for a 12-gauge spherical ball rifle; that the grooving should be shallow and broad; and that the bullet should be of the same diameter as the bore. In this he was quite correct; the system was perfect, and is the same as used to-day for large-bores using spherical and short conical projectiles. When using a thin patch, the loading was easily effected, the bullet being uninjured by hard ramming; when firing, the patch instead of the bullet took the grooving, and imparted a rotary

motion to the bullet, which retained its sphericity, and so offered less resistance to the atmosphere. Any charge of powder could be used without fear of stripping the bullet. With the breech-loader the only modification is an increased size bullet, which fills up the grooves entirely, and a reduction in the number of grooves. The characteristics of this rifle are: velocity equal to a smooth-bore, accuracy sufficient for sporting distances, flat trajectory, and great striking energy. It was held in high esteem by Indian sportsmen for some years, but is now in a measure superseded by the Double Express.

#### THE ORIGIN OF THE EXPRESS.

Many lay claim to the invention of the Express principle, but to this honour we think no one man is justly entitled. It is of gradual growth, and has slowly developed into its present state of perfection.

The special feature of the Express is its long point-blank range, the essential quality of the sporting rifle.

The true definition of the term "point-blank" is given by Captain Forsyth in "The Sporting Rifle":—"The point-blank range of a sporting rifle is defined to be the distance up to which a shot may be taken without considering elevation at all: that is, covering exactly the object intended to be hit."

It is evident that the longer this point-blank range can be made the better will be the rifle for sporting purposes. The Kentucky rifle,\* of American production, was pre-eminently distinguished in this respect. At anything under 100 yards the aim was taken point-blank with the same sight ; and consequently, it made no difference whether the squirrel squatting on a branch, or the wild turkey's head over the tree-top, was at 20; 50, or 90 yards away ; only cover it truly, and down it went.

Another feature in the Express is its great striking force. This is obtained by reducing the bore to about one-half the area, retaining the heavy charge of powder, and diminishing the weight of the projectile to about half that of the 12-bore. The high velocity imparted to the light bullet by such a heavy charge causes it to expand upon impact, and thus exerting its entire energy upon the animal struck.

Express rifles are made considerably lighter than the weapons in use formerly, while the accuracy is more precise at distances between 150 and 300 yards.

Different degrees of penetration are to be ob-

\* The Kentucky rifles were made by several of the principal makers in the United States previous to the year 1850. There were several sizes : one was bored to take spherical balls of 90 to the pound, and had a barrel of steel 42 inches long ; others of larger bore carried balls of 60 and 40 to the pound. The usual method of charging was to place the ball in the palm of the hand, and then pour the rifle powder over the ball until it was covered.

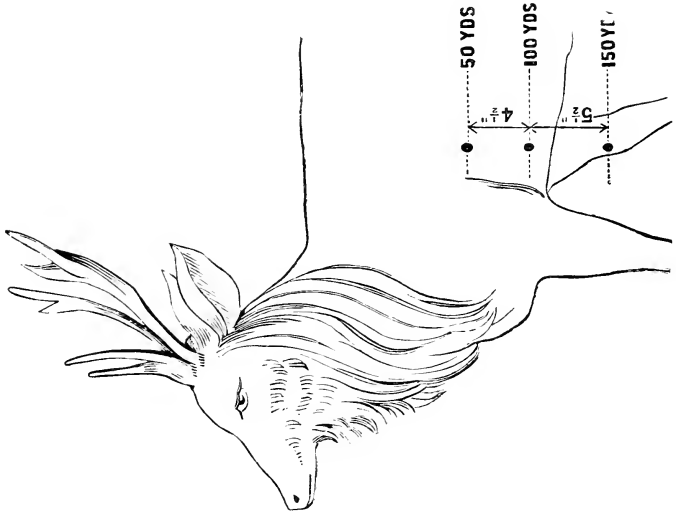
tained by slight modifications in the projectiles employed in the same Express rifle.

The solid hardened bullet possesses sufficient penetration for the largest of game; a softer lead bullet will mushroom slightly upon impact, but still give good penetration. A bullet with a hollow point, not too deep, has high velocity and penetrative force; by degrees the hollow may be increased to obtain expansion upon striking, or the bullets may be reduced in length until they are suitable for the lesser animals.

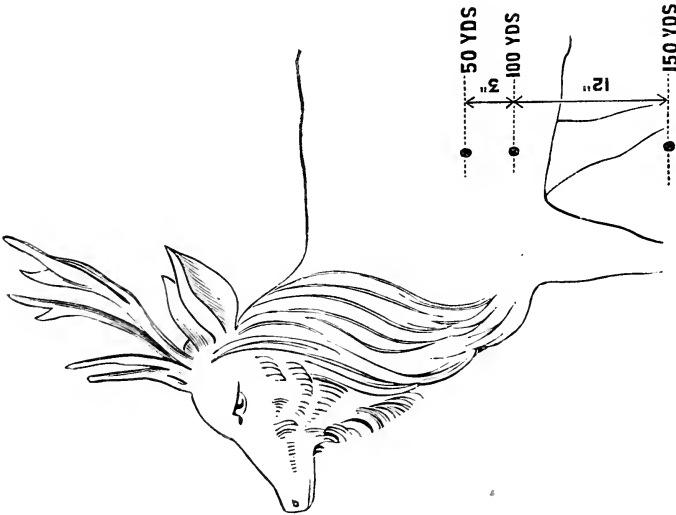
The foregoing remarks apply alike to all the usual Express bores from '360 to '577.

Although previously stated in this chapter that long-range military rifles were unsuited for sporting purposes, we have now an exception in the '303-bore Lee-Metford, which, by reason of its long-point blank-range and exceptionally high velocity, is to be classed as an Express, since the true meaning of Express, as applied to rifles, is a rifle giving a higher initial velocity than 1,600 feet per second, with a trajectory flat enough to admit of one sight for all sporting distances. The '303-bore has all the qualities of the Express in the highest degree: in fact, it surpasses by far the usual standard of Expresses in point of velocity and trajectory.

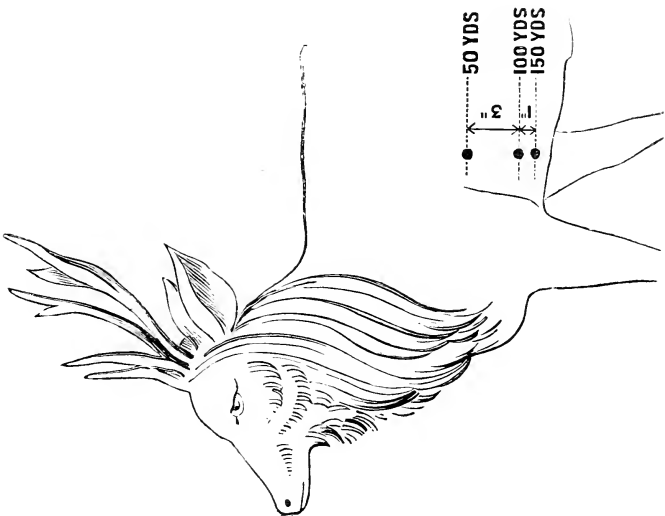
To better illustrate the advantage of the flat trajectory; with the '303 rifle, it is necessary only to use one sight for any distance up to 200 yards,



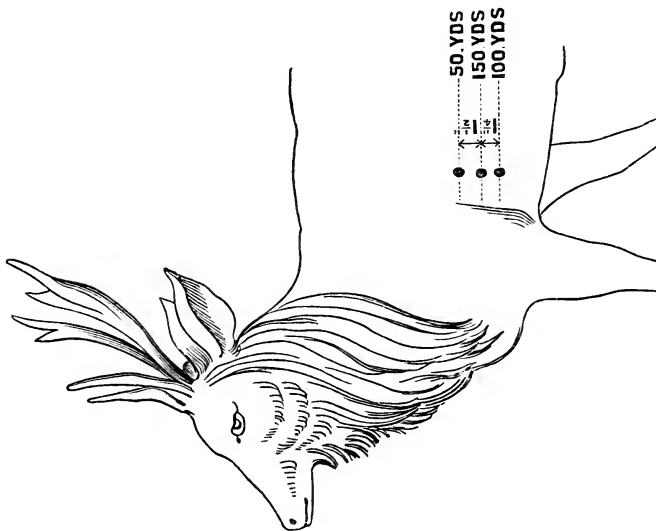
.577 Express.



Martini-Henry.



No. 2 Express.



No. 1 Magnum Express.

Diagrams showing Positions of Shots fired from 50, 100, and 150 yards, using 50-yard Sight only.

a fine sight being taken for 100 yards and a full sight for 200 yards ; this is sufficient allowance to obtain the correct elevation.

The illustrations here given are designed expressly with the object of showing at a glance the advantage of a flat trajectory for rifles intended for sporting purposes. The same system has been repeated in each case for the various bores, in order that comparison will be easy.

The drop of the bullet is indicated in inches on each wood-cut for three distances : 50, 100, and 150 yards.

These diagrams were made at all distances with the 50-yard sight.

With the .500 and .450 Expresses the mean drop is so slight at distances between 50 and 150 yards (being only  $4\frac{1}{2}$  inches and 3 inches respectively), that it gives command of the vital portions of any ordinary-sized animal's frame from any point within the longer range. With the .577 Express the average drop is 10 inches ; and with the Martini-Henry, 15 inches.

In the .450 diagram, the shot fired from 150 yards are shown higher or nearer the 50-yard shot than is the 100-yard shot ; this is in utter disagreement with all laws governing the flight of projectiles, and can only be attributed to the peculiar effect of the "jump" action of the rifle in firing, which gives an increased elevation in addition to the permanent angle of the sight adjustment. In



a lesser degree it is also shown in the diagram of the '500-bore.

With a 12-bore rifle firing a spherical ball with 7 drachms of powder a diagram would be obtained very similar to that of the Martini. The mean drop between the 50 and 100 yard ranges is about  $2\frac{1}{2}$  inches, and 14 inches in the next 50 yards.

With the '303, the diagram would have still less vertical deviation than the '450 Express.

It will be readily seen, then, that for unknown distances such a rifle has an enormous advantage for sporting purposes; and although it may not be possible to make a diagram on the target at a known range superior to the Martini, the shooting would be infinitely superior at unknown distances, since the one sight of the '303 is correct for any sporting range; whereas, with the Martini elevation would be required. At ranges over 200 yards the '303 is far superior to the Martini for accuracy, as will be seen by the reports from South African sportsmen, whose letters we reproduce in another chapter for reference.

As with all Express rifles, the penetration of the '303 is regulated by the kind of bullet employed. The hard bullet, nickel-coated, as used by the army, has sufficient force to penetrate the whole length of an elephant; many such instances have been recorded from time to time in the sporting papers. It was recently reported that two rhinos were killed by one bullet as they stood side by

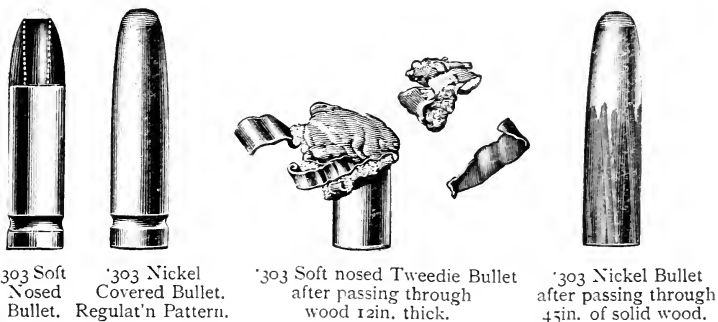
side. For sporting purposes, the Tweedie, or soft-nosed, bullets are generally used, being so designed as to expand on striking the game.

Other methods have been tried to adapt the .303 bullet to sporting purposes: by making it open at the point, by making longitudinal slits through the hard metal case, spiral slits, circular slits—in fact, almost any plan which will weaken the bullet, and cause it to lose its shape on striking. Another effective plan is to file off about  $\frac{3}{16}$  of an inch of the point, which gives a bullet suitable for soft-skinned animals; many experiments have been tried with these projectiles. The following letter appeared in *The Field* in April, 1894, and will best convey an idea of the effect of such bullets on game:—

“ Having procured a horse which was killed in the ordinary manner, we immediately (while the body was quite warm) had it strung up by the legs. The first shot, fired at 60 yards, struck behind the shoulder; the bullet passed through the rib, and sufficiently expanded to cut the heart to ribbons, and smashed the rib on the opposite side; the second shot at the shoulder; the bullet entered the bone, smashing it into powder and breaking up into small pieces; the third shot, from 140 yards, at the hip, completely smashed up the entire bone; the bullet broke up in a similar manner to the second shot; the bones in the vicinity of the points of entrance of bullets were not only pulverised for a

circumference of 3 to 4 inches, but were split up for some distance."

The appended wood-cuts show the forms taken by the various bullets after use. Under each will be found the explanation.



'303 Soft Nosed Bullet.      '303 Nickel Covered Bullet. Regulat'n Pattern.      '303 Soft nosed Tweedie Bullet after passing through wood 12in. thick.      '303 Nickel Bullet after passing through 45in. of solid wood.

The illustration of the muzzles shows the exact size of the '303-bore, applied to double rifles; it is the smallest of the Express rifles. The lightest



weight for such a rifle is 8 lbs., the standard charge is  $71\frac{1}{2}$  grains black powder, or 30 grains of cordite; the velocity obtained by the former is 1,850 feet per second, the latter 2,050; the extreme range being 3,500 yards. Until the introduction of the '303, the smallest of the Expresses was the '360. It

is particularly suitable for bustard, gazelle, and roe-deer shooting. The bullet weighs 155 grains, and the powder 50 grains; double rifles can be made as light as 6 lbs. with 26-inch barrels. They are handy little weapons, with great smashing power. The range is 250 yards, point-blank range 130 yards.

The .400 Express is a hard-hitting weapon, and very effective for deer-stalking in general. The bullet weighs 230 grains, powder 80 grains; with 26-inch barrels the minimum weight is 7 lbs. It has a range of 250 yards, with a point-blank range of 160 yards.

The .450 Express is an excellent all-round weapon; it is not too large for the Cervidæ, whilst it is equally effective among tapirs, seals, and bears, and may be successfully used at leopards, panthers, tigers, and the larger soft-skinned carnivora. The bullet weighs 270 grains, powder 110 grains. The lightest weight for a rifle of this bore is 7 $\frac{3}{4}$  lbs. The effective range is 300 yards, and point-blank range 150 yards.

Rifles of this bore, when firing bullets of 360 grains, have been successfully used by Mr. Selous and other African sportsmen at lions and, with a still heavier bullet, even at elephants.

The .500 Express, of exactly  $\frac{1}{2}$ -inch bore, is considered by most Indian sportsmen as the most effective all-round weapon for that country; it has great smashing power, good penetration, and it is

not too cumbrous to cover moving game. The bullet weighs 340 grains, the charge of powder is usually 130 grains, the range is about 300 yards, and the point-blank range 130 yards. The minimum weight for the rifle is  $8\frac{1}{4}$  lbs.

The .577 is the largest Express rifle manufactured; it possesses great smashing power, and is particularly useful in boar-shooting and among dangerous game. The bullet weighs 520 grains, the powder 160 grains. Its effective range is a little over 220 yards, point-blank about 120 yards;  $10\frac{1}{4}$  lbs. is the lightest weight for this bore rifle.

The recoil of the smaller Express rifles is reduced to a minimum; with the .303 it is less than with an ordinary 12-bore game gun; in the .400 it is cognisable; in the .450 and .500 it is not at all uncomfortable; but with the .577 it is heavy. The benefit of a double rifle is apparent, as the extra weight of the double barrel considerably modifies the recoil.

The "Magnum" Express differs from the simple Express in the cartridge, which is of greater capacity than those generally employed, and is loaded with heavier charges, and as light a bullet as compatible with accuracy. In some cases it is only the Express principle overdone; in others, benefits result. Rifles for the "Magnum" should be heavier than the simple Express.

The charges of powder and weight of bullets will be found in tabulated form on page 303.

Double rifles, similar to above, using same cartridge cases, are also made to shoot accurately, and give good penetration, up to 500 yards. These almost rank semi-Express rifles, for such results can only be obtained by reducing the powder charge and increasing the weight of the bullet.

LENGTH AND WEIGHTS OF DOUBLE-BARREL SPORTING RIFLES.

	Length of Barrels.		
	26 inches.	27 inches.	28 inches.
360 Double Express ...	6 lbs.		
400 " " " ...	7 lbs.	7 $\frac{1}{4}$	7 $\frac{1}{2}$
450 " " " ...	7 $\frac{3}{4}$ lbs.	8	8 $\frac{1}{4}$ —9
500 " " " ...	8 $\frac{1}{4}$ lbs.	8 $\frac{1}{2}$	8 $\frac{3}{4}$ —10
577 " " " ...	10 $\frac{1}{4}$ lbs.	10 $\frac{1}{2}$	10 $\frac{3}{4}$ —11

If made for the "Magnum" Cartridge, a little heavier is recommended.

	Length of Barrels.					
	22 inches.	23 inches.	24 inches.	25 inches.	26 inches.	27 inches.
20-bore Rifle ...			6 lbs. per Spherical	6 $\frac{1}{4}$	6 $\frac{1}{2}$ —8	
16 " " " ...			7 " "	7 $\frac{1}{4}$	7 $\frac{1}{2}$ —9	
12 " " " ...			8 " "	8 $\frac{1}{2}$		8 $\frac{3}{4}$ —11
10 " " " ...			10 " "	10 $\frac{1}{2}$		11 $\frac{1}{2}$
8 " " " ...	13 lbs.	14 lbs.	14 $\frac{1}{2}$ —15			

	Length of Barrels.						
	22 inches	23 inches	25 inches	26 inches	27 inches	28 inches	30 inches
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
20-bore Choke-bore Rifle ...			6		6 $\frac{1}{4}$	6 $\frac{1}{2}$	
16 " " " " ...			6 $\frac{1}{4}$		6 $\frac{1}{2}$	6 $\frac{3}{4}$	
12 " " " " ...				6 $\frac{3}{4}$		7	7 $\frac{1}{4}$ —9
10 " " " " ...			8		8 $\frac{1}{2}$	9—10	
8 " " " " ...	11	12		13			

CARTRIDGES FOR EXPRESS RIFLES.

Bore.	Powder.	BULLETS.	
		Hollow.	Solid.
.360 Express 2¼ in. st. taper ... ..	50 grs	155	190 gr.
	2⅞ in. „ ... ..	55 grs	
.400 Express 2⅜ in. bottle-necked ... ..	80 grs	230	260
.400 „ Magnum, 3¼ in. „ ... ..	110 grs	230	260
*.450 „ bot.-neckd 2¾ in. „ ... ..	110 grs	270	310 or heavier
.450 Long straight taper, 3¼ in. ... ..	120 grs	270	
„ „ „ „ „ „ ... ..	120 grs	325	365
.450 Magnum, bottle-necked, 3¼ in. ... ..	140 grs	325	365
†.500 Express, bottle-necked, 2⅞ in. ... ..	130 grs	340	380
.500 Straight taper, 3¼ in. ... ..	142 grs	440	480
„ „ „ 3 in. ... ..	136 grs	340	380
.500 Magnum, bottle-necked, 3¼ in. ... ..	160 grs	440	480
.577 Express, straight taper, 2¾ in. ... ..	160 grs	520	560
„ „ „ „ 3 in. ... ..	167 grs	570	610

\* The Standard Cartridge for the No. 1 Express, and for which all our rifles are constructed, unless distinctly specified otherwise.

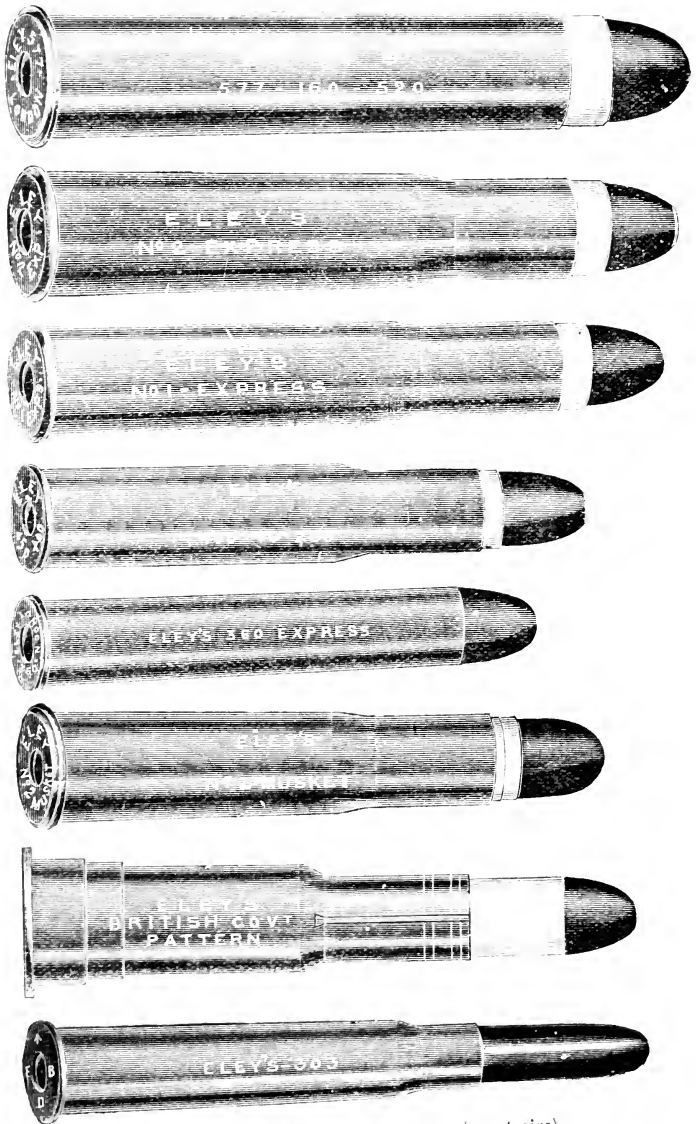
† Standard Cartridge for No. 2 Express, .500 bore.

CARTRIDGES FOR LONG-RANGE SPORTING RIFLES.

	Powder.	Bullets.
No. 1 Carbine .450 1½ in. bottle-necked ... ..	55 grs.	380
No. 2 Musket .450 2⅞ in. „ „ ... ..	76 „	480 Hollow
„ „ „ „ „ „ ... ..	65 „	400 Express
„ „ „ „ „ „ ... ..	70 „	450
„ „ for Sealing Rifles ... ..	90 „	270
„ „ for Metford Match Rifles ... ..	90 „	540
Regulation Martini 577/450, Solid Brass ... ..	85 „	480
„ „ „ „ Boxer ... ..	85 „	480
„ „ .303 ... ..	71½ Black	215
„ „ „ „ „ „ ... ..	40 Riffite	215

The above are the Standard loads for Rifle Cartridges as generally supplied by Messrs. Eley Bros. and G. Kynoch and Co. They are obtainable at storekeepers' and gun dealers', and may be relied upon as correctly loaded.

Heavier bullets for special purposes can be supplied.

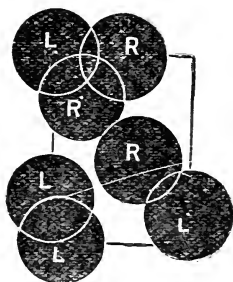


Express and Long-Range Cartridges (exact size).



## ACCURACY AND RANGE OF SPORTING RIFLES.

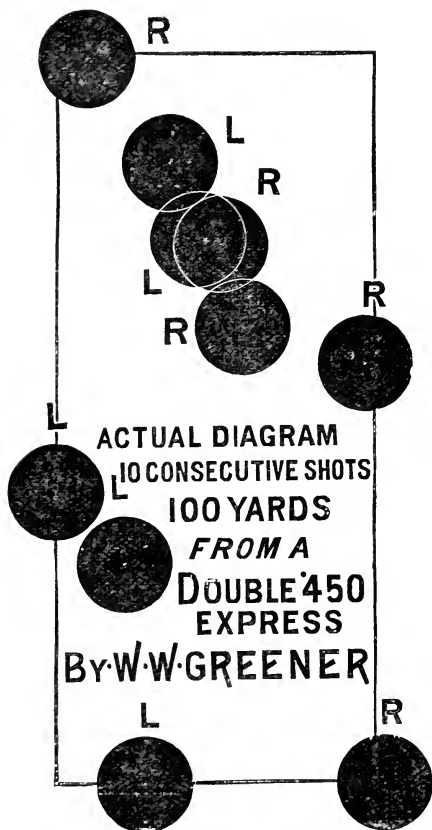
For most sporting purposes, the condition of accuracy is held to be filled if all the shots are grouped within a 6-inch circle at 100 yards, and this degree of accuracy is possible of attainment without sacrificing the velocity of the bullet or discarding the enormous advantage of the second shot obtainable from the Double Express.



No. 1.—7 Shots from No. 1 Express, 100 yards.

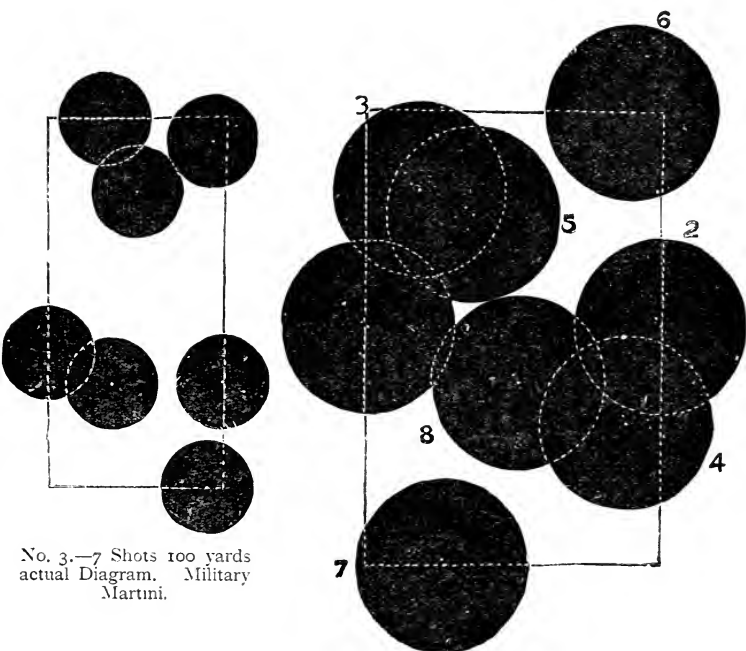
Selected rifles, under favourable circumstances, are capable of making finer diagrams, but much depends upon the circumstances and the man behind the rifle. Diagram No. 1 is an exact reproduction of the shooting made at 100 yards with a Double-barrel No. 1 Express, by W. W. Greener, by the editor of *Sportens* at Helsingfors; a finer diagram has never been made with a Double Express rifle. Diagram No. 2, made with a 25-guinea Greener rifle, is just above the average for a No. 1 Express.

No. 3 diagram was made with a Martini-Henry at 100 yards.



For distances of 200 yards and over, the heavier the bullets the better will be the shooting.

Large-bore rifles, 12 to 8 gauge, will not quite equal the Express in point of accuracy. The diagram No. 4 is that of a double 8-bore, with



No. 3.—7 Shots 100 yards  
actual Diagram. Military  
Martini.

No. 4.—8-Bore Double at 50 yards.

spherical ball and 10 drachms of powder at 50 yards; 8 shots in  $2\frac{3}{8} \times 1\frac{9}{16}$  inches.

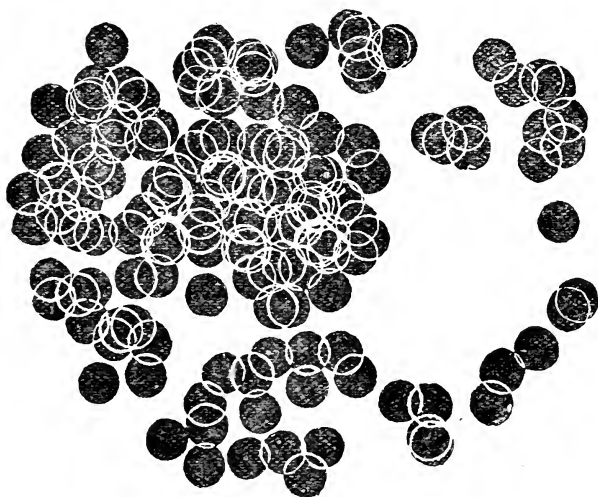
Diagram No. 5 was made by A. H., of Saigon, with a Greener double 8-bore, weighing only 13 lbs. The charge used was 10 drachms of powder with

spherical ball; 147 hits in a 12-in. circle at 110 yards out of 163 shots fired.

Most large game is shot at very close distances.

Captain Forsyth says of jungle shooting:—

“One-half at least are shot at under 50 yards, three-quarters under 75 yards, and all, without



No. 5.—8-Bore, 147 hits in 12-in. circle at 110 yards.

exception, under 100 yards. On the hills a shot at 150 yards may sometimes be made.”

Another well-known sportsman allows a greater range. In a letter written to the author he states:—

“I have just made a bag with my .450 Ejector,

killing three very fine Markhor (mountain goats) in three shots at about 300, 250, and 180 yards."

Of the sport in Africa, the usual sporting ranges will be learned best from the opinions of a few of the leading hunters.

Count Samuel Teleki says :—

"In my trip in Africa I killed 18 elephants with the '577, 3 of these animals being killed with a single bullet each, shot in the head, at distances ranging from 90 to 100 yards; 1 from 250 yards. My experience is that when it is necessary to shoot big game at fairly long range the '577 is an invaluable weapon, and infinitely more valuable than a Winchester. In all, I killed 82 rhinoceri, 75 of them being bagged with the '577 at various ranges; I also bagged 84 buffaloes, some with the '500, shooting the solid bullet, and nearly all the rest with the '577; on one or two occasions the bullet went quite through the body of the animals. I have always found, in shooting big game, that the shock conveyed by the heavy bullet driven by a fairly large charge of powder is a most desirable feature in a rifle, and absolutely essential when shooting game at anything like close quarters."

Another sportsman, writing to *The Field*, says :—

"At the time I was shooting best in March,

being strong and well, I bagged with the .577 alone (a rifle weighing 10 lbs. 6 ozs.) 25 head of game, comprising buffalo, zebra, wart-hog, bush-pig, hippo, and lion in 27 consecutive shots."

From another letter we extract:—

"My best record was 25 buck and a pig out of 27 shots (.577); pig, badly wounded, got away, otherwise I should have bagged 26 head of game. My 16 hippopotami out of 17 shots is a matter of history in the Shire Highlands (.577 and hard bullets)."

Although in the last two accounts the actual distances are not mentioned, from a conversation we had with the gentlemen we are able to state that the ranges were mostly under 80 yards, and many under 20; this is in a measure confirmed by the fact that so many head of game were killed with so few cartridges.

There has recently been much discussion on the merits of the .303-bore for elephant and large game shooting, and many remarkable performances with this bore have been recorded.

One great advantage it possesses over the larger bores is that of weight. Up to the present time, as will be gathered from the foregoing letters, 8-bores and the .577 Express rifles have been the favourite weapons with hunters of large and dangerous game. They possess enormous power, and their bullets convey great shock, which is the principal feature in guns of this class.

VELOCITIES, STRIKING ENERGY, PENETRATION.

Weapon.	Weight.	Length of Barrel.	CHARGE.		Muzzle Velocity, ft. sec.	Striking Energy, ft. lbs.	Penetration of 1 in. Pine Boards.
			Powder.	Bullet.			
.300 Express	6 lbs.	27 in.	50 grains, No. 6	150 grains	1591	850	
.400 "	7-14 oz.	26 in.	"	209 "	1873	1509	
.450 "	8-14	26 in.	"	322 "	1777	2260	
.500 "	9	26 in.	"	444 "	1784	3154	24½
.577 "	10-2 oz.	26 in.	"	573 "	1683	3006	22½
Martini-Henry	9 lbs.	33⅓ in.	"	480 "	1315	1841	
.303 Lee-Speed			40 "	Cordite	2050	2016	
"			71½ "	Black	1850	1642	12½
12-bore Rifle	11½	26 in.	7 drams	525 Spherical	1460	2497	13½
10 "	12½	26 in.	8 "	689½ "	1480	3369	19½
8 "	13-15 lb	24 in.	10 "	875 "	1620	5225	19½
8 "			10 "	1237 Conical	1530	6316	19½
4 "	21	24 in.	14 "	1257½ "	1500	6315	

The 8-bore, owing to its great weight, has been discarded by many sportsmen in favour of the .577, which is capable of good work, as the following extracts from Sir Samuel Baker's book will testify :—  
“ The .577 solid bullet of 650 grains and 6 drachms of powder will produce an astonishing effect, and will completely paralyse the attack of any lion or tiger, thus establishing a thorough confidence in the heart of its proprietor.

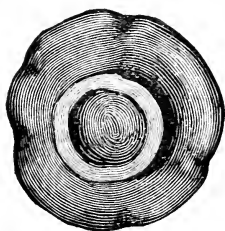
“ A very large tiger may weigh 450 lbs. ; a .577 bullet of 650 grains, propelled by 6 drachms of powder, has a striking energy of 3,520 foot pounds. This may be only theoretical measurement, but the approximate superiority of 3,500 lbs. against a tiger's weight 450 lbs. would be sufficient to ensure the stoppage of a charge or the collapse of the animal in any position, provided that the bullet should be retained within the body, and thus bestow the whole force of the striking energy.”

#### BULLETS.

The selection of bullets for dangerous game shooting should be very carefully made, since the wrong employment of a projectile may lead to serious consequences. A sad experience of an adventure with a tiger was reported in an Indian journal a few years ago. Mr. Frazer, a police superintendent, made an attempt to shoot a tiger with a light hollow bullet at five feet distance only ; the bullet struck exactly in the centre of the face,



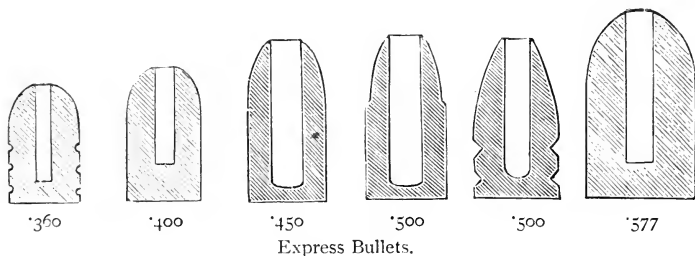
but just an inch too low, knocking out the right eye and smashing all the teeth; the second shot, taken hurriedly, struck the tiger in the chest, but too low; the bullet unfortunately broke up instead of penetrating. Had the bullet been solid, there can be no doubt that the tiger would have succumbed to the first shot. The affair unhappily ended in the death of the orderly and a severe wounding of Mr. Frazer.



'577 Bullet of Pure Lead extracted from Tiger.

Concerning bullets, Sir Samuel Baker says:—  
“A bullet of pure lead, '577-bore, with a velocity of 1,650 feet per second, will assume the form of a button mushroom immediately upon impact, and increase in diameter as it meets with resistance upon its course, until when expanded beneath the elastic hide upon the other side, it will have become fully spread, like a mature mushroom. I prefer pure lead for lions, tigers, sambur deer, wapiti, and such large animals, which are not thick-skinned, as the bullet alters its form and nevertheless remains intact; the striking energy being concentrated within the body.”

The difference in the striking energy of a hollow bullet from that of a solid is enormous, owing to the inequality in weight. If you wish a bullet to expand, use soft lead, but keep the metal solid; if great penetration, use hard solid metal—either  $\frac{1}{10}$  tin or  $\frac{1}{13}$  quicksilver. Nickel-coated bullets, except for the '303, should be used with the greatest precaution; those made for the Martini are '008 of an



inch too large for the bore, and require a specially constructed rifle of '461 calibre.

#### SINGLE RIFLES FOR SOUTH AFRICAN SPORT.

In South Africa for shooting antelope on the open veldt at long ranges, accuracy is the essential quality of the rifle; also great penetration is required in order to ensure the bullets reaching the vitals, as many shots are taken at animals going away.

The Martini has been the favourite weapon, and is most commonly used. The sporting pattern is the most suitable; it is half-stocked, has pistol grip and solid, flat, engine-turned rib, as shown in

the illustration. It has either the 2- (or more) leaf and tangent sight, or the 7-leaf flush sight.

Another system of breech-action in general favour is the Field sliding block action, its chief advantage being easy access to the breech end of the barrels for cleaning purposes. To operate the mechanism, the lever on the side of the action is pressed forward (*see* illustration). Both the Martini and the Field mechanisms are applicable to the .303 bore, which should supplant all others for South African shooting, owing to its low trajectory, great penetrative force, and extreme accuracy at unknown distances and long ranges.

The breech mechanism of the Lee-Speed magazine rifle is not liked by many sportsmen on account of its clumsy appearance. The projecting bolt on the sliding block is awkwardly arranged and liable to catch in the clothing, and so become displaced; for sporting purposes the Martini system is to be preferred, on the score of neatness and ease of manipulation.

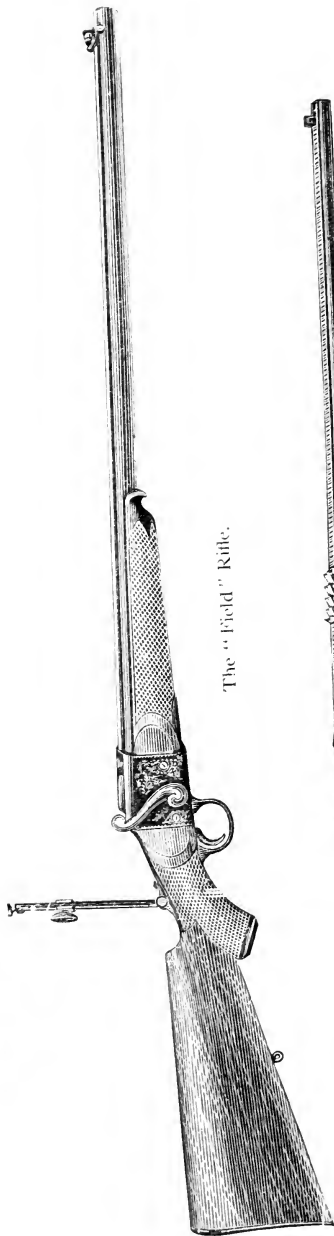
Appended are a few testimonials to the good qualities as sporting rifles of this new bore, as actual practice on game is more convincing than experiments at targets and fixed objects.

Extract from letter :

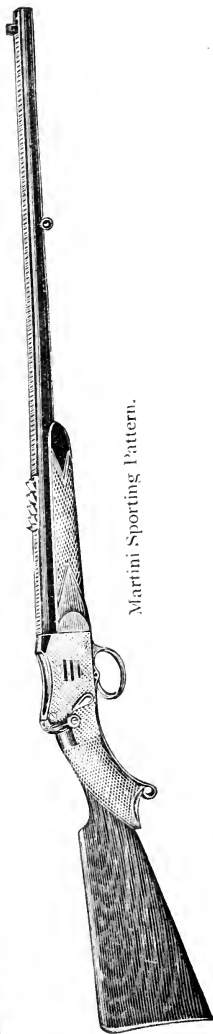
“The .303 rifle I tried, and was very pleased with the result. I had a large shooting-party out the day I tried it; unfortunately, the day was very much against me—blowing ‘great guns’ as the



Lee-Speed Magazine Rifle.



The "Field" Rifle.



Martini Sporting Pattern.

Cape expression goes—but, notwithstanding, half the bag of the day fell to the '303 Greener: namely, 23 out of 46 buck.

“GRAAFF REINET, 1893.”

Extract from letter just received from South Africa:

“We have received the six '303 rifles and the cartridges; they are most satisfactory. I tried mine, and made the largest bag in the shortest time on my record: viz., 11 bucks in an hour.

“J. R.”

Extract from *The Kimberley Independent*:

“A curious thing connected with the gun is that it has scarcely any recoil and but a slight report. The penetration is very great; two shots fired at a heavy stinkwood post by Mr. A. J. Wright went right through, and left a hole as clean and unsplintered as if it had been made with a gimlet. At 200 and 300 yards the point-blank shooting was all that could be desired. At 400 yards Mr. Wright made 5 consecutive bulls; at 500 yards he made 3 bulls and 1 centre; at 800 yards, 2 centres and 1 bull. Time being short, the remaining trials were made without a marker; but at 1,000, 1,500, and 1,800 yards Mr. Wright and Mr. Finlason succeeded in hitting the target five times out of six shots. In order to try the extreme ranges, four shots were fired at 2,500 yards, and Mr. Wright missed the target by only a

couple of yards; while Mr. Finlason highly astonished himself by dropping a bullet just over the target on to the mound. Half in jest, the party went back to Mr. Wright's house, and aimed at the Diamond Fields Horse cannon target; and with the aid of a field-glass the bullets, on two occasions, were distinctly seen to strike over the target. The distance is about 3,500 yards. This is an extraordinary range for any rifle. Exactly the same results were obtained from the Martini, which has been adapted to the Magazine '303 Rifle Cartridge. The rifles were made by W. W. Greener, who is licensee under the Lee-Speed patents to manufacture them."

A cheaply-made rifle of '303 bore on any system whatever should be avoided, since the strain exerted is greatly in excess to that on any other rifle. When adapted to the Martini action of best quality, it is most reliable, and can be guaranteed.

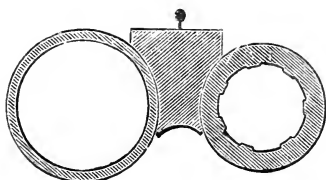
A double-barrel Ejector '303 is now made, and will, no doubt, be the future weapon (for those who do not object to the price) for sport in South Africa.

#### COMBINED RIFLE AND SHOT GUNS.

The combination of a rifle and shot gun in one double-barrel weapon is much esteemed by South African sportsmen. The right barrel is usually full-choke 12-bore, 30 inches in length (longer

barrels are made to order). The left is rifled, and generally bored to shoot the No. 2 musket cartridge, 76 grains powder, and 480 grains solid bullet. It is sighted from 100 to 700 yards with a 7-leaf flush sight.

It is made on Greener's treble wedge-fast principle, as no other system of breech action is adapted so well to withstand the enormous strain produced by the heavy bullet.



Combined Rifle and Shot Gun.

The rifle barrel may have Metford rifling to take the Metford match bullet, 540 grains, with the usual charge of powder.

Express bullets may be used with large charges of powder from the rifle barrel. The right barrel will shoot spherical ball with accuracy at short ranges, and will also be suitable for buck shot. The lightest weight for a weapon of this class, with barrels 30 inches in length, is  $8\frac{1}{2}$  lbs., but a few ounces heavier will be found an advantage.

A combination .450-bore rifle and 16-bore shot barrels with 30-inch barrels can be made as light as 8 lbs. ; .303- and 16-bore,  $8\frac{1}{2}$  lbs. to 9 lbs. ;

·303- and 12-bore, 9 lbs. to 9½ lbs. Other combinations to special order.

Greener's Special Interchangeable Sights for target and game shooting used upon special order.

The prices for such weapons are :—Hammer rifle and shot gun combined, treble wedge-fast breech action, from £17 17s. upwards; Hammerless, from £21 upwards.

#### GREENER'S PATENT CHOKE-BORE RIFLE.

This weapon is distinctly different in principle to the rifle choke-bores offered under fancy names, and it achieves what none other has yet accomplished. It is a perfect shot gun and perfect rifle in one.

The grooving is invisible, cannot foul, and is as easily kept bright and clean—*throughout its whole length*—as is the barrel of the shot gun.

*It has the accuracy and force of the heavy rifle combined with the lightness and handiness of the shot gun.* It is, without doubt, the best weapon for snap-shots at large game, deer-drives, boardrives, also tiger, bear, and elk-shooting, or whenever advantage has to be taken of a snap-shot at driven or moving large game.

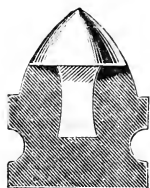
It performs equally well with conical and spherical ball, solid and hollow bullets, light and heavy charges of powder. Shoots shot of any size, making regular patterns equal to any ordinary cylinder gun.



With a gun on this system weighing 7 lbs., *good diagrams* can be made up to 80 yards, with charges of powder up to  $3\frac{3}{4}$  drachms and spherical ball, *without excessive recoil*.

The "stopping" power of the spherical ball is well known to all hunters of large game.

The short conical bullet, with steel core and point (as illustration), has great striking-force and penetration.



Steel-Pointed Bullet.



Spherical.



Hollow Conical.

#### SMOKELESS POWDERS FOR '303 AND OTHER RIFLES.

The smokeless powders for use in rifles have not yet been brought to a desirable state of perfection. With rifleite the shooting obtained is not constant; the diagrams made are more or less what is technically known as "up and down": that is, a good single '303 will make an oblong diagram at 100 yards, measuring 2 inches wide by 6 to 8 inches deep, with an occasional shot still lower, and not squarely grouped, as would be the case when using black powder. We attribute this

to the variation in strength of the detonating powder in the caps, which produces uneven quickness of combustion of the powder, and resulting in different velocities. Another fault at present existing in connection with the ammunition for the '303 is the greater liability to miss-fires. In consequence of the greater pressures developed, it has been found necessary to increase the thickness of the metal caps. The ordinary primer was liable to burst and allow the gas to escape through the striker hole. These faults, however, will doubtless be overcome in the near future.

Black powder gives less velocity than rifleite or cordite: hence the shooting with black will be lower than with either of the others; and it follows that with a rifle sighted for one powder a slight allowance will have to be made when using others giving higher velocities. The velocities taken by chronograph record—rifleite, 2,020; cordite, 2,050; black, 1,850. The latest powder introduced for the '303 is known as Corded Ballistite.

These high velocities are obtained at the expense of a greatly increased strain upon the breech-action and barrels. The pressure exerted has been computed to be 18 tons to the square inch: a pressure considerably higher than produced in any other rifle. It is evident, then, that double rifles, to withstand this enormous strain, must be made of the very best materials only, and upon the strongest system known. The Treble-Wedge

Fast Breech-action already described, applied to either the Hammer, Hammerless, or Ejector actions, is the only suitable system.

#### LARGE-BORE RIFLES FOR BIG-GAME SHOOTING.

My close attention to this branch of the gun trade has gained my rifles a well-known reputation, and these arms may be styled one of our specialities.

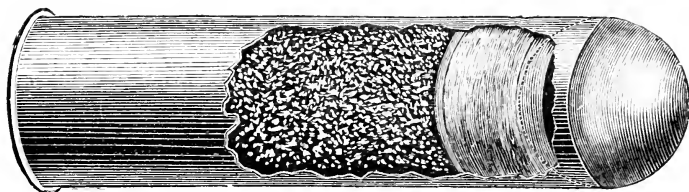
The question as to whether a large rifle is or is not a necessary adjunct to successful big-game shooting has long been disputed. Many well-known Indian sportsmen are in favour of large-bore rifles, and deem them indispensable to slay so ponderous an animal as a full-grown elephant; and to stop a charging bison, a weapon is required that will give good penetration, with great smashing and paralysing power. The rifles should invariably be double-barrelled, and the material and workmanship of the finest quality. I believe that the double 8-bore rifle, with the brass case, and specially rifled for the 1,008-grain spherical and short conical ball, will be found sufficiently powerful for the largest game. Until I introduced these solid-drawn brass cases, the 8-bore was in reality only a 9-bore, the bullet weighing 900 grains.

The breech action should be with the patent Treble-Wedge-Fast, either of hammerless or with back-action low hammers, as illustrated.

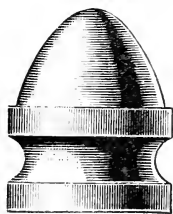


3-Bore Double Rifle

The ordinary weight of such a rifle with 24-inch barrels is about 16 lbs. ; but they have been made as light as 13 lbs. to give excellent results. The recoil with a rifle of this weight, when using spherical ball, will not be found excessive. The diagram of 147 hits in a 12-in. circle at 110 yards.



8-bore Brass Cartridge for Elephant Rifle (exact size).



8-bore Conical Bullet.

shown on page 330, was made with a rifle of this weight.

The usual charge for the brass case is from 10 to 12 drs. of powder, loaded with spherical ball as illustrated.

These rifles are sighted up to 200 yards, and have a point-blank range of about 100 yards, beyond which distance they are seldom used. A pistol

hand is invariably attached, to enable the rifle to be more firmly gripped.

Double 4-bores are made on the same principle, and with the same actions as the 8-bores described above. They, however, are generally bored perfectly cylindrical, and not rifled. They weigh from 18 to 20 lbs. The powder charge is 12 to 14 drachms, and a bullet of 1,510 grains.

The author of "Thirteen Years among the Wild Beasts of India" wrote of his large-bore rifles :—

"Greener's Treble-Wedge-Fast Rifle, 8-bore, double-barrelled, weighing 17 lbs., and Greener's Treble-Wedge-Fast, double smooth-bore, 4-gauge Ball Gun, weighing 19 lbs., were built for me by W. W. Greener in 1874, since which time they have been in continual use, and have been fired several hundreds of times with 12 drams and a 2-oz. bullet, and with 16 drams and a 4-oz. bullet respectively. They have never required any repair, and are still sound, and the breech-actions as close as when they left the factory. They have given me every satisfaction.

"S. P. SANDERSON,

"Superintendent of Government Elephant  
"Keddahs, Dacca."

It should be noted that solid brass cases are recommended, and will always be used by the author for rifles of this bore, unless expressly ordered to the contrary. The internal diameter

of the brass case being greater than that of the paper, it allows the use of a larger bullet, as explained in the chapter on Brass and Paper Cases.

Owing to the great difficulty in producing perfect barrels of Damascus of so large a bore, Greener's wrought steel is used in preference; Laminated steel and Damascus by special arrangement only.

For large-bore rifles heel-plates of india-rubber are usually fitted, to lessen the effect of the recoil. Some sportsmen prefer a properly padded shooting-coat, as the rifle can be brought up into position much more freely.

#### ON THE CHOICE OF A SPORTING-RIFLE.

With most sportsmen the occasions for firing a rifle at large game are comparatively few; they will consider it false economy to purchase a cheap weapon, especially if such weapon is less efficient and likely to fail them when favourable opportunities for using the rifle occur.

In hunting large and dangerous game, it is better to be able to fire two shots in one second than to have four or six or a dozen available at intervals of two or three seconds each; as a hunting-weapon, or sporting-weapon, the double rifle is superior to the magazine rifle, no matter on what principle the breech mechanism is constructed.

The next point is, not to be underarmed ; that is to say, the weapon must be fully up to the maximum work it will be called upon to do. Either the '450 or '500 double Express is probably the best all-round weapon for general Indian shooting ; if bison is likely to be met frequently the '577 is preferable.

As stated already, much depends upon the loading of the Express. Mr. F. C. Selous, in his "Travel and Sport in South-East Africa," says that '450 express bullets lighter than 360 grains should not be used for hartbeest, lions, and other similar game. And again on the choice of a rifle—"Should any of my readers acting on my advice determine to buy a '450 rifle, let them be very careful about the kind of bullet they use. For large game, long heavy solid bullets, and for large antelope and lions, the best kind of bullet is one weighing about 360 grains, with a small hollow point, good thick walls round the hollow part, and a heavy end. Such a bullet will mushroom on striking an animal, but will also have great penetrating power."

The bore of the rifle will sometimes appear to be of less importance than the weight of the arm. No one can use a heavy rifle effectively if he has also to carry it long distances ; and in countries where a gunbearer or attendant is not available, the weight of the arm will be of greater importance. Unnecessary weight has long been a conspicuous cause of complaint against American rifles ; this,



however, is one result of manufacturing rifles in quantities by machinery.

A test of the .450 calibre Winchester with a powder charge of 90 grains, and a solid bullet of 200 grains was made at a London shooting-ground in December, 1893; the results, as published in *The Field*, of December 9th, showed that the muzzle velocity obtained was 1,527 feet, at 200 yards 1,051 feet, energy at muzzle therefore 1,557 foot-pounds, at 200 yards 738 foot-pounds, thus greatly inferior to the ordinary English Express of .450 gauge, with 110 grains, and 320-grain bullets, which gives 1,776 feet muzzle velocity, 1,218 at 200 yards, energy at muzzle 2,254 foot-pounds, and at 200 yards 1,066 foot-pounds.

It is, of course, possible to secure better results for special work by permitting an excess of one feature by sacrificing others; and in the American rifle, as a sporting weapon, too much appears to have been sacrificed to accuracy, possibly because, as Mr. Gould states, "I believe fully twenty shots are fired at an inanimate target to one at game."

It has already been stated that none of the American rifles are so powerful as the English Expresses.

The following experiences of a young sportsman well known to us will verify this statement. He says:—

"A short time ago I had an extraordinary experience when shooting fallow-deer from a position

up a tree with a '44 Winchester rifle. I selected an animal for my mark on the outside of a herd some 40 yards away, the only point offered being behind the left ear. My aim was perfectly true, the bullet striking the root of the ear and passing down under the brain cavity and out under the right eye; this was a good shot, but it failed to bring the doe down. A second shot, taken a short time afterwards, struck behind the right ear, taking exactly the same direction corresponding with the first shot, until it met the course of the first bullet, which it adopted, passing out of the same hole under the right eye. After chasing the herd for an hour and a half, the doe, dropping out, gave an opportunity for another shot, which was taken at the neck, behind the ears; the bullet passed through the muscles above the spinal column, taking away a piece of the bone. The fourth, a side-shot, struck through the tear-hole (an inch below the eyes).

“The fifth hit low in the neck. This at last brought her to the ground, enabling me to get up to her and complete my work with a knife.

“I was afterwards asked why I did not try the shoulder shot. In the first place, behind the ears was the only mark offered; and, secondly, I had previously taken a shot with the same rifle at a doe, which struck only 3 inches behind the heart, and it was not until after a two hours' run that this animal was secured.

“The skull of the animal, showing the bullet-marks, we had in our possession for some time.”

After this experience with the Winchester, our friend discarded it in favour of a '450 Express, which he has used at all subsequent shoots with great success.

To compare with the above we give an account of his next shoot with the '450 Express.

At a doe going away, at a distance of 50 yards, aim was taken between the ears; the bullet carried away about 3 or 4 inches of the top of skull, exposing the brain, and killing instantly.

Another curious shot demonstrates the value of velocity: a deer, in the act of jumping, was struck by a '450 Express bullet just below the knees, which knocked off both legs at the joints, leaving the upper sides of the joints as though severed with a knife.

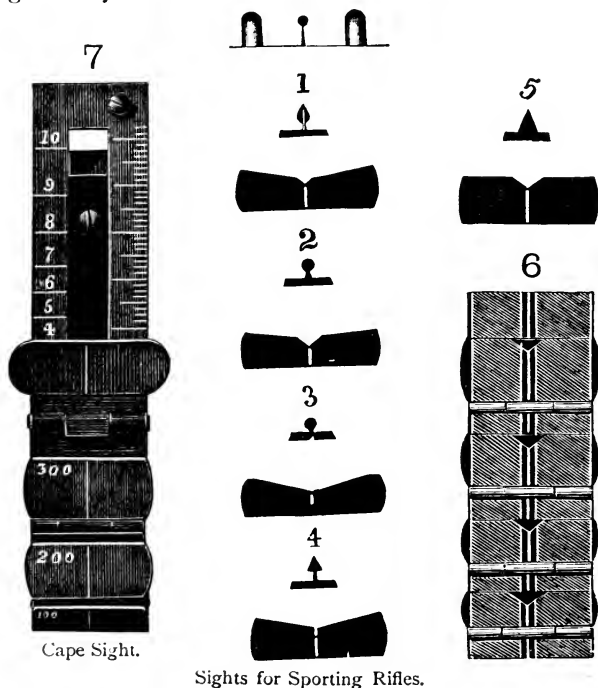
Our correspondent has since had much experience in deer-shooting, and affirms that he never had occasion to fire a second shot at a deer with a '450 Express.

Neither does he remember ever seeing a deer hit with a '450 bullet run more than 20 yards before falling.

Although the foregoing remarkable shots were all made with a '450, we consider the '400 bore Express much more suitable, being quite powerful enough for deer-shooting.

## SIGHTS FOR SPORTING RIFLES.

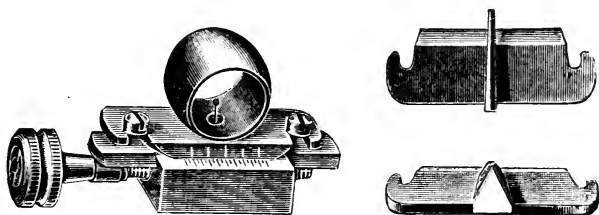
There are various forms of sights used for sporting rifles. We give illustrations of those most generally used.



No. 1 bead sight is a good form for large-bore rifles. Nos. 2 and 4 are suitable for Express or Target rifles. No. 3 is considered the best for fine shooting; the V is broad and extends the whole

width of the leaf, having a platina line to mark the centre; sometimes a small slot is preferred, as in No. 4. No. 3 is also adapted for rough work, and is not easily broken. No. 6 is a leaf sight, roughed to prevent reflection. The muzzle sights are put in lengthways instead of across the rifle, as formerly, and are frequently inlaid with platina for jungle shooting.

THE FAVOURITE SIGHT for use at the Cape is a leaf and tangent sight combined (Fig. 7), being suitable for both game and target practice. A



Greener's Interchangeable Sights.

7-leaf sight for 100 to 700 yards, and occasionally a 10-leaf sight is preferred, for rifles intended for game shooting only. These sights are all suitable for double and single rifles, and the combined rifle and shot gun.

IVORY FORE SIGHTS are recommended, as they catch the eye quickly when shooting at running game in bush country.

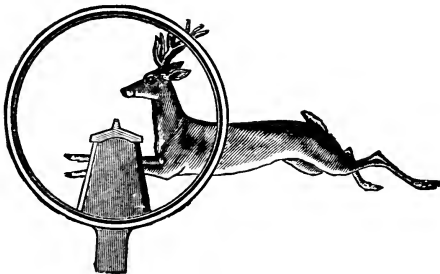
FORE SIGHTS, for use at night, have ar

enamel-fronted leaf, which may be closed down flush with the rib when out of use.

GREENER'S INTERCHANGEABLE FORE SIGHTS for game shooting and target practice. The great advantage of this system is :—A new sight in case of accident, or another pattern to suit circumstances, can be fitted in a few seconds, without the aid of tools.



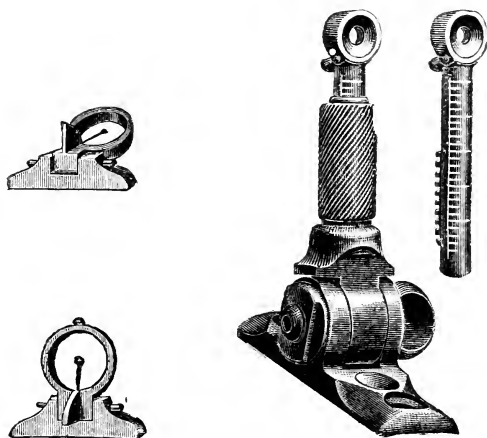
Open V Sight.



Lyman's Sight.

LYMAN'S FORE SIGHTS are applicable to single, long-range, and rook rifles.

TELESCOPIC SIGHTS are fitted to special order ; they are adjustable, and with spring eye-piece, to



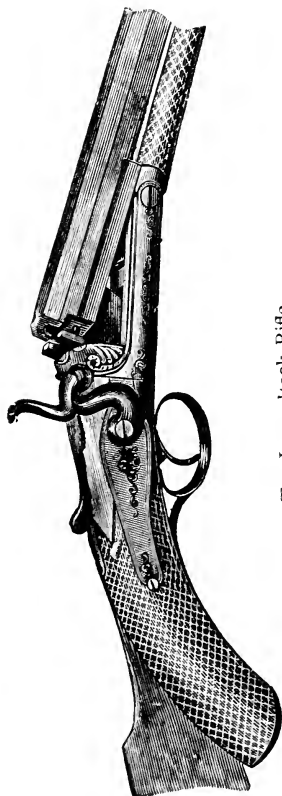
Lynman's and Beach Peep Sights.

prevent injury to the eye from the recoil, with cross wire for different distances. Easily fixed and removed.

ROOK AND RABBIT RIFLES.

For rook and rabbit shooting, single breech-loading rifles are generally used. There are at present several sizes in the market, the most popular bores being :—

Bore.	Powder.	Bullet.
'297/230	3 grs.	38 grs.
„ long	5 grs.	38 grs.
'297/250	7 grs.	56 grs.
'295	10 grs.	80 grs. } Same Rifle
'300	10 grs.	80 grs. }
'360 No. 5	14 grs.	134 grs. } Same Rifle
'380 long	12 grs.	124 grs. }



Top-Lever Kook Rifle.



Martini Rook Rifle.



The breech actions applicable to rook rifles are : the Martini, the top-lever, the side-lever, and the hammerless.

The top-lever Hammer Rook Rifle has the ordinary bottom holding-down bolt, half pistol-hand, rebounding lock and octagonal barrel. The extracting is effected by a strong lever on the side of the breech action engaging with the extractor. Such rifles are sold at prices varying from 6 to 10 guineas, according to the quality and style of finish.

The well-known Martini action is most suitable for small rifles when properly made, and for the cheaper qualities is recommended in preference to a cheap and necessarily unreliable hammerless. It is neat in appearance and easy to manipulate. It has the advantage of a safety bolt, and of being a hammerless ejector, since a jerk of the lever expels the fired case. The prices range from 4 to 8 guineas.

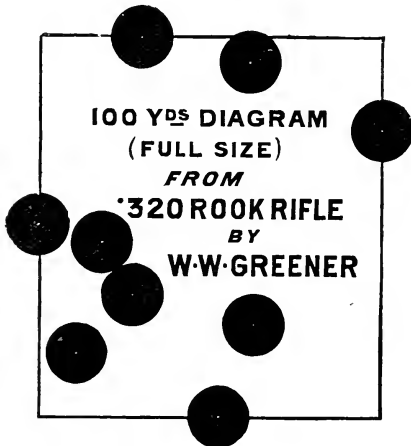
The side-lever system may be had by those who prefer a drop-down action to the Martini system. Prices from 4 to 5 guineas.

Hammerless rifles are constructed with a suitable mechanism of the Anson type ; they are strong, reliable, and simple, and cost from 10 to 12 guineas.

Rook rifles are usually sighted up to 150 or 200 yards. The short .360 and the .320 bore cannot be considered accurate beyond 100 yards, but up to that distance they are perfect.

The .380, with a solid bullet, is accurate and effective up to 200 yards.

For naturalists these rifles offer special advantages, as the skin is only broken in one place, and the range is greater, thus enabling the collector to

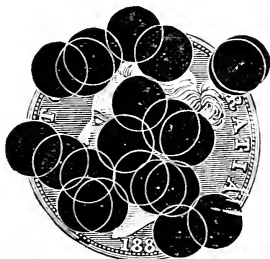


add to his bag many specimens that could not be obtained with a shot-gun.

The diagrams here shown were made by a member of the firm with a .320 bore Martini rifle.

At 40 yards the 21 consecutive shots fired are all within the size of half-a-crown; and at 100 yards the mean deviation is only  $\frac{1}{16}$  inch, and all shots contained in  $1\frac{3}{4} \times 2$  inches.

Two shots were taken from this rifle by a friend in our presence: the first at a sparrow sitting on a high tree; the second at a small bird on a hay-rick thirty yards distant; both birds were killed. This



21 Consecutive Shots on size of Half-a-Crown, 40 yards.  
320 Rook Rifle.

speaks well for the sighting and adjusting of the rifle.

The .300 bore is the general favourite for rook and rabbit shooting.

The .220 is too small a bore to be of much greater value than as a saloon rifle.

## CHAPTER XII.

## RUDIMENTS OF RIFLE-SHOOTING.

AIMING PRACTICE—POSITIONS FOR RIFLE-SHOOTING—PRONE—KNEELING—STANDING—THE BACK POSITION—POSITIONS FOR TARGET AND GAME SHOOTING.

THE beginner should first make himself acquainted with the rifle he is about to use; that is to say, he should understand something of the trajectory and the elevations required for the distances he is likely to shoot at. This and the mechanism of the lock should be his first study. Then comes the correct method of aiming.

*Aim.* If the following few simple instructions be carefully observed, he will have the foundations of a good rifleman's knowledge. As to whether he will excel as a rifle shot depends upon his personal ability and application. Aim is dependent upon the quality of eyesight, the care with which it is applied, and the steadiness of hand.

Practice should first be made at a target having a 6-inch bullseye at 100 yards.

The system of aiming adopted by almost every good shot, and undoubtedly the best method, is to

align the rifle beneath the centre of the bullseye and gradually raise it until the tip of the foresight appears to almost touch the bottom edge, care being taken to keep the rifle perfectly upright. A small space should always intervene—the amount should be just as little as the eye can recognise without any strain, as shown in the small woodcut. To aim at an object it must be seen ; if the object



As the Bullseye should appear above the Sight.

and the foresight be of one colour ; no definite spot can be chosen by placing one over the other, as both will appear to merge into one.

To aim correctly, take more or less of the foresight over the true centre of the backsight ; but never more at one time than another. We advise a full sight, that is, the whole of the bead of a sporting foresight, or with a military rifle a half-sight—the half of the barleycorn.

*Position.* We recommend the prone position to beginners, as being more steady than either standing or kneeling. Lying in the prone position, the body should be carried well to the left, at an angle of about  $45^{\circ}$ , with the legs well apart ; the rifle, when at the shoulder, then comes well across

the chest ; the left shoulder being well forward, the elbow of the left arm will very comfortably take a position on the ground, almost under the fore-end, and the forearm should be as nearly upright as the elevation of the rifle will allow ; the fore-end and barrel should be firmly grasped with the left hand, but there must be no straining of the muscles or a tremulous motion will be set up, which is fatal to good shooting ; in fact, one of the most important factors in obtaining steadiness in any position is to feel perfectly easy in the position adopted ; this is soon gained by practice. The right hand should grip the small of the stock firmly, and the forefinger be placed so far round the trigger as to press it with the second joint ; the pressing must not be sudden, but a very gradual increase of pressure until the scar is released. After a little practice, one knows exactly what amount of pressure is required ; this is a point upon which the beginner should be most careful. It should be practised in every position many times, simply snapping the lock without any charge in the barrel ; the eye should be kept on the sights steadily, and any movement of the sights from the correct aim when pressing the trigger should be noticed, and the practice continued until the trigger can be pulled without any movement of the rifle. This is of more importance to the beginner than it at first appears, for if he commences to shoot without any of this position and aiming

practice, the recoil and smoke will prevent his observing this error.

When the shots can be kept in a circle of 6 inches on the target at 100 yards, the kneeling position may be tried.

The left foot should be pointing to the right front. Kneeling on the right knee with the foot well behind the left, the lower joint of the right leg will be exactly at right angles to the rifle, and the left elbow resting on the top of the left knee will bring the arms and rifle in the same relation to each other as described in the prone position. Shooting in this and the standing position in windy weather is more or less uncertain work, with even the best shots; and snap-shots must be taken under such conditions. Some men find an advantage in swaying the rifle gently across the target, and pulling the trigger sharply as the foresight is approaching the edge of the bullseye; but we cannot altogether recommend this system to the beginner. For the standing position, turn almost to face half-right, and carry the right foot well away from the left and almost at right angles to the target; this brings the rifle when at the present well across the chest, and the left hand is thereby able to hold the rifle well forward more easily, and without straightening it too much. This position is of course the most unsteady, but at the same time it is the most useful for general sporting purposes, and should be well practised. The back

position, except for long ranges, is not much needed by the sportsman. To take this position readily and correctly, sit on the ground facing the target, holding the rifle across the body; lie on the back, then turn sufficiently on to the right side to allow of the right thigh being almost squarely on the ground; the legs should then be drawn up, placing the left foot on the ground, toe pointing to the right front, with the knee almost upright, but inclining slightly to the left. The right knee should be bent round the left foot so that the outer side, or that next to the ground, rests on the left instep.

The barrel of the rifle should be laid on the right knee; the left hand, grasping the top of stock close in front of the heel-plate, pulls it into the hollow of the shoulder more between the body and arm than in the other positions; raise the head and take a small portion of the left coat-sleeve at the wrist between the teeth, to steady the head.

The right elbow rests on the ground, and the right hand, gripping the stock lightly, has little to do but press the trigger as usual.

From this position aim can be taken comfortably and accurately especially at long ranges with the aid of orthoptic and spirit-level sights.

The position, although possessing the advantage of steadiness and better vision for long ranges, requires more practice to acquire properly. A slightly lower elevation should be allowed on



account of the greater distance between the eye and foresight.

#### POSITIONS FOR RIFLE-SHOOTING.

Of positions in rifle-shooting, Mr. A. C. Gould, in "Modern American Rifles," says, "A rifleman is generally able to shoot well in almost any position, if the object shot at be large, and at short ranges; but when he aims at the 8-inch bulls-eye at a distance of 200 yards, or one proportionately reduced at a shorter distance, it is found that it is impossible to hold the rifle perfectly still, and the attempt is made to find a position in which one can hold the rifle best. Undoubtedly, the physique of a person has its influence on the choice of positions, for nearly every rifleman sooner or later decides on some position which suits him best, and takes it when shooting.

"Young riflemen very naturally study the position of experts, but as they find fine shots shooting in various attitudes, it generally follows that they try the different positions until they find a preferred one."

For shooting buck at long range, the prone position is considered the best, and most generally adopted by the sportsmen of South Africa. The legs should be apart, and inclined towards the left, thus reducing the effect of recoil; this position should not be taken when the weapon used is an 8-bore :

we have recently read of a sportsman who has cause to regret so doing when firing at an elephant. The recoil when in this position would be very great ; he would have done better to have adopted the kneeling position, or even a sitting position, resting the left elbow on the left knee.

It has been found in practice that a rifleman shoots higher when he fires from the prone or the kneeling position than when shooting from a standing position.

## APPENDIX.

## SINGLE TRIGGER GUNS.

SINCE the last edition of this book was published, guns having but one trigger to fire both barrels have been introduced, and have received much attention from sportsmen and gunmakers. Though some of the earlier designs are intricate and complicated, and the liability to accidental discharge with them not always satisfactorily overcome, the departure on the whole has been very successful. The advantages to be derived from the change are certainly considerable though varying with individual shooters; three are specially noticeable.

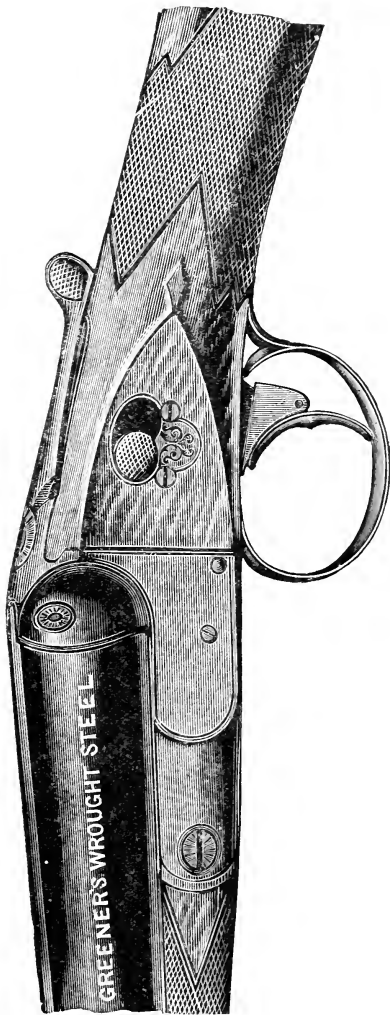
Firstly, since the hand has no longer to be moved back to reach a second trigger, a better fit of stock can be arrived at, while improved marksmanship also results from its unvarying length. Secondly, a much quicker second shot can be fired, and a larger percentage of kills will consequently be secured. This quality will make it particularly serviceable to trap-shooters, where the pigeons must be dropped within a narrow boundary. Lastly, the bruising of the back of the second finger against the guard—a matter of importance to some sportsmen—is avoided. On the other hand, with some of the single

trigger mechanisms trouble has occasionally been experienced, and these advantages partly detracted from, by the impossibility of firing either barrel first when desired or as necessity occurs.

For wildfowling or mixed shooting, where guns with barrels of different shooting powers, or where cartridges loaded differently for each barrel are desired to be used, it is imperative that the single trigger invention should have a selective action. Moreover, it is desirable that the mechanism employed to effect this should be simple, reliable, and capable of being employed instantly without effort. Those hitherto designed have not fulfilled these requirements, but, on the contrary, have been either ineffectual or awkward to manipulate, and have invariably multiplied the complications and increased the delay in firing.

In the trigger now to be described, however, these difficulties have been overcome and intricacies successfully avoided by making use of a different principle from that employed in any other single trigger. It enables the object in view to be accomplished by the aid of two limbs only.

This mechanism, to which the author has given the name "Selective Trigger," consists of a trigger blade of the ordinary form, slotted to receive the "selective" finger pull, which is pivoted in the lower part of the blade, and

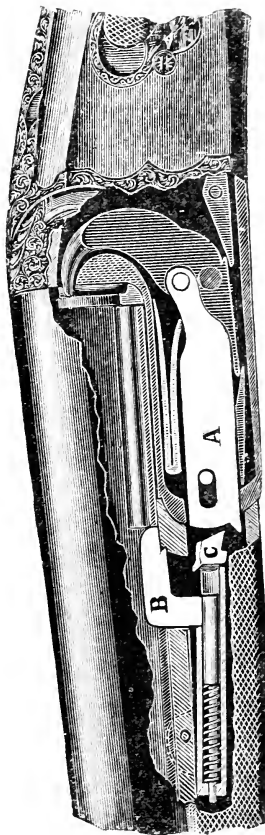


W. W. Greener's "Selective" Trigger.

has an arm reaching upwards to the sears. If the finger pull is pressed above the pivot (marked on the pull by a slight ridge), this arm keeps its normal position under the right sear and releases it in the ordinary way; but, if the pressure be applied below the pivot, the finger pull rocking backward on its centre brings its upper arm forward and under the left sear, before the trigger blade itself is moved. The motion being continued, the whole trigger moves upward, and the left sear is released. When the pressure is removed, the trigger, under the influence of a small spring, returns to its normal position, with the arm of the finger pull under the *right* sear.

It is impossible to discharge both barrels together, for even should the finger press exactly on the ridge the trigger will automatically lock itself till such a time as the power is diverted into a sufficiently upward or downward direction to fire either the right or the left barrel respectively.

The Selective Trigger, besides being subjected to every conceivable mechanical test, has been used in the field by many unprejudiced sportsmen, and has given satisfaction from the first in spite of the unaccustomed movements of the finger its use entails. Among others, the editor of *Land and Water* was very successful at the first trial, as the report published in the issue of that paper for February 5th, 1898, gives ample proof.



The Monarch Ejecting Mechanism.

## THE MONARCH EJECTOR GUN.

Many sportsmen having shown a preference for an ejector with separate locks for the ejecting mechanism, the author has experimented for a long time with the view to finding one with the strongest possible action combined with the least complication in design.

The "Monarch" ejector (see illustration) seems to fill these requirements, and after many trials the author has found it to be perfectly reliable under all circumstances.

As shown, the parts are few and simply arranged, and the design enables each limb to be strongly made, which is a very necessary point in all fore-end ejectors.

During the last two years the author has sold some hundreds of "Monarchs" without having received any complaint of their efficacy, and intends to use this system much more extensively in the future.

## WROUGHT STEEL FOR GUN BARRELS.

In spite of the numerous steels, chiefly of foreign manufacture, which have recently been introduced, the author has nothing to detract from his former remarks in this book regarding the material best suited for the above purpose.

Considering in the first place the composition of the



different manufactures of steel barrels, then the various processes to which they are afterwards subjected in the building up of the gun, and above all the known nature, and the probable extent of strains they are intended to resist, he still thinks that Wrought Steel will be found the best, and that in practice it will give the most satisfactory results.

During the nine years Wrought Steel barrels have been manufactured not one has ever been returned to him burst, and remembering the quantity of new nitro-powders, giving so many different kinds of strain to the barrel, which have come into fashion in that time, this must be considered a test of wonderful severity.



## LONG SHOTS.

*EXTRACTS FROM THE LONDON "FIELD."*

MY gun is one of W. W. Greener's first quality, 28-in. barrels, 6 lb. 10 oz., both barrels full-choke. I used it on partridge the first half of September with a light spread charge (2 $\frac{3}{4}$  drs. and 1 oz. No. 6, card wad only between powder and shot) in both barrels, and found it all I could desire. When birds got a little wilder I introduced the ordinary long-range charge for the second barrel, and frequently brought down birds dead at 50 yards to over 60 yards. I have used the spread charge with good results in covert shooting, on pheasants, hares, rabbits, and woodcock, without in a single instance spoiling either fur or feather. I find it kills well up to 40 yards. With the ordinary long-range cartridge, loaded with No. 5 shot, I have on three occasions killed pheasants dead at over 60 yards. But, apart from the extra range gained with the choke-bore, there is another and, to my mind, a more important advantage—I mean the style in which it kills at the middle distances—30 yards, 35 yards, and 40 yards. This is noticeable with all kinds of game, but perhaps especially with hares. The collapse of a hare under the choke-bore, with No. 4 or No. 5 shot, is remarkable.

The accusation against "chokes" of smashing the game is, I believe, much exaggerated. With the ordinary cartridge I have killed pheasants, hares, and rabbits within 20 yards, and they have not been shattered. The new gun seems to me much less objectionable in this respect than the old gun with the concentrator.

In conclusion, I would say to those seeking information and advice, "If you are a fair shot, and want a new gun for

general shooting, by all means get a choke-bore; but do not go to a second-rate man, or to one who does not believe in chokes, but will make you one if you like. Go to one of the makers whose names are associated with these guns, and who 'do believe in them.'"

Lancashire, Dec. 18.

FIAT EXPERIMENTUM.

*From THE FIELD, January 13th, 1877.*

SIR,—I have recently been using a choke-bore, full choked, built for me by W. W. Greener, at rabbits ferreted in small coverts and hedge-banks, and can therefore answer some of the inquiries as to the effect of such guns for that kind of shooting. My gun weighs 7 lbs., is 28 in. long in the barrels, is light at the muzzle and heavy at the breech, and is an exceedingly handy one, with which I can get quickly on my quarry. I was desirous of finding a charge that, with No. 5 shot, would give a pattern of about 130 in a 30 in. circle at 40 yards, and found that with  $3\frac{1}{2}$  drs. of No. 4 powder, a  $\frac{3}{8}$  n. felt wad on powder, 1 oz. of No. 5 chilled shot, and card on shot, I could obtain a steady average of 130 pellets at such circles at 37 yards (the extent of my target range), the pellets being very evenly distributed over the whole circle, and with great force. This charge I have been using at rabbits with marvellous effect. It paralyses them so completely on hitting that they are utterly unable to move. The penetration is so good that the pellets pass clean through the rabbit when hit sideways, and when hit going straight away the penetration is proportionally deep, and they are rolled over at once. Not one that has been hit has escaped, and there has not been an instance of one being cut into ribbons, and afterwards creeping into a hole. The effect was the same at about 45 yards. An ordinary gun, with a charge of  $1\frac{1}{8}$  oz. of No. 6 shot and  $3\frac{3}{4}$  drs. of powder, puts into a similar circle from 130 to 140 pellets, but with far less penetration than the first-mentioned charge

from the choke-bore, consequently the killing powers of the choke-bore are much greater. The rabbits that were shot at moderate distances were not spoilt, and those shot at very close quarters were not more so than would have been the case had they been shot with ordinary guns. If thicker shooting is required, the addition of  $\frac{1}{8}$  oz. of similar shot, and also of a cloth or pink-edged wad on the powder, gives a pattern of about 165. The addition of another  $\frac{1}{8}$  oz. of shot, making  $1\frac{1}{4}$  oz. of shot, the powder being kept up to  $3\frac{1}{2}$  drs. throughout, brings the pattern up to about 180, and with great penetration, but without any appreciable recoil when using the gun at game. It is evident, therefore, that by the use of different sizes and charges of shot these guns can be so loaded as to make them available for any description of shooting, and as I find that I can hit with this gun equally as well as with my other guns, I feel assured that choke-bores will become favourites in the hands of those who know how to use them, and who take care that the bend and length of stocks are right for them. Such guns will kill in a far cleaner manner, and score more game. Should thinner shooting be required, the shot only should be reduced, as reduction of the powder reduces the penetration, and tends to keep the shot more clustered, and makes the pattern less regular. Should less penetration be required, it is preferable to use smaller sizes of shot and lesser charges of them than to reduce the full charge of powder, as a full charge of the latter spreads the shot more, and makes the pattern far more even, thereby increasing the chances of hitting.

W. F. B.

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SIR,—When I was over at Scarborough a few weeks since I shot seven herons, four of which I killed at extraordinary distances with No. 4 shot. They were as follows : 80 yards, 95 yards, 110 yards, and 130 yards ; the last bird I fired at was at an angle of 50 degrees, and fell directly it was struck, falling head first, and as the day was fine and no wind, the distance I was off could not be overestimated,

as from where I stood to the dead bird it measured a trifle over 100 yards. I may mention that I fired at it out of spite, it having seen me and would not come nearer.

C. METCALF.

Kingston Villa, New Parks, Scarborough.

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*Extracts from THE FIELD.*

SIR,—I have often read inquiries in your columns about choke-bore guns. I purchased a 12-bore last September direct from Greener, and must say that I have killed a few most extraordinary shots—viz., a wood pigeon (single bird) at least 100 yards distant; several partridges at or over 80 yards; one rabbit running, broadside on, distance measured 81 yards. I put five No. 6 shots into her, two of them passing clean through. Another most extraordinary shot:—I fired at a single mallard rising from the Thames, wounding the bird sufficiently for my companion to walk up to it and kill it afterwards. This distance was judged by three friends with me to be at least 150 yards. No. 4 shot used. I am prepared to prove all these statements, if required, by independent witnesses. I have since purchased a second gun for a friend, and that turns out equally good.

WILLIAM BOX.

Uffington, Faringdon, Berks, Jan. 12.

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SIR,—Having purchased one of Greener's No. 12 choke-bores this season, I beg to give you the following as my experience of it. I consider it kills on an average at least 20 yards further than a non-choke bore, and if large shot is used will kill at great distances. I myself killed a heron sitting at 100 yards, and on skinning the bird found he was hit in five places. I have also tried it on wild-fowl with good success at distances at which an ordinary gun would not have been of any service. I have made good bags on snipe and other game during the last month without smashing the birds.

Leamington, Jan. 10.

You will be pleased to read the following :—I was out on the Monday following Christmas-day with a shooting-party in the bush, and had with me one of your noted PATENT TREBLE WEDGE-FAST guns that I purchased from you, when I did good work with it. I killed at 90 yards a fine bush buck ram, weighing about 150 lbs. ; hit him on the heart side ; had a charge of buckshot A.A.A. ; and a friend of mine killed a wild duck, with one I sold him, flying, at over 90 yards.

W. THOMPSON.

Port Elizabeth.

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SIR,—The gun arrived safe, and I have spent a few days at plover shooting, and find that the gun shoots first class. I killed with one barrel at 45 yards twenty plover, I also killed a single plover at 63 yards, and two out of three that were flying at 80 yards. I killed three out of a flock of about 150 plover at 101 yards. The gun suits me in every way. I enclose you the account of the first pigeon match I shot with it ; you will see that I made the best shooting, killing my birds cleaner than anyone.

W. M.

London, Ont.

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*Extract from AMERICAN FIELD, Jan. 7th, 1893.*

Our guns were full-choke Greener hammerless 12 gauges, and cartridges loaded with  $3\frac{1}{2}$  drams by measure of S.S., a waterproof and two pink-edge wads, and  $1\frac{1}{2}$  oz. No. 3 chilled shot. George and I killed 100 geese from 60 to 90 yards. One day, as a joke, George fired at a flock of geese over 100 yards from him, and brought down five with one barrel, three of them stone-dead. A flock of brant came to one side ; I raised my gun. "Don't shoot !" said George. I did though, and killed two of them fully 115 yards.

WILLIAM BRUCE LEFFINGWELL,

*Author of "Shooting on Upland, Marsh, and Stream."*

DEAR SIR,—I performed a feat, with the Royal Quality Ejector Gun you made for me, to-day that I think is worth mentioning. I was out with my brother and the keeper, snipe shooting; when near the river up got a duck and a mallard and flew off down wind. I expected they would turn and come back over us, so we got behind a high bank. As I expected, they did come back, right over us. I fired and hit the mallard with my first barrel, and killed him with the left. The duck went on; but I threw out the cases and slipped in a No. 8 as quick as lightning, and brought down the duck stone dead 60 yards off. This is a fair proof of the value of an ejector gun. I shall tell my friend Lythall of this.—Yours faithfully,

(Signed) GEO. A. PASSINGHAM.

Fermoyle, Castle Gregory, Co. Kerry,  
Jan. 8th, 1895.

*Extract from a letter by G. A. PASSINGHAM, Fermoyle,  
Co. Kerry.*

You ask me how the gun handles. I am pleased to say it is simply perfect in this respect, and is a most powerful gun—by far the best shooting gun I ever had. I have had a double 8 by Cogswell & Harrison, a single 4-bore by J. & W. Tolley, and a single 8 by the same maker, and a single 8 by a local man (Gallyan, of Cambridge); but this gun of yours beats them all. I give you three consecutive shots:—Two teal out of a flock; the two aimed at killed at 110 yards. One widgeon out of a flock of about thirty, at 151 yards (measured, not stepped). Two ducks at 110 yards, both killed—not two out of a flock; the mallard fell dead, and the duck flew on 300 yards and fell dead.

I do not mean to say the gun is going to repeat such a performance as this often, but the gun must shoot very hard, for the widgeon had two No. 1 shot right through him, in at the back and out at the breast, at 151 measured



yards ; the bird was standing in some shallow water at the time. . . . There is no recoil at all now ; I would not mind pulling both the triggers at once.—Yours faithfully,

(Signed) G. A. PASSINGHAM.

P.S.—The loads used were:—Black, 6 + 2¼ No. 1 ; Schultze, 75 + 2⅞ No. 1 ; Schultze, 84 + 2½ No. 1.

[Weight of gun 11½ lbs., 32-in. barrels.]

*Extract from THE FIELD, January 26th, 1895.*

SIR,—Mr. Chapman, in his interesting articles on “Wild-fowling,” is, I think, unduly prejudiced against 4-bore and double 8-bore guns. The idea of a 4-bore recoiling to such an extent as to capsize a single-handed punt is absurd. I have fired a good many shots from 4-bores, but never felt any unpleasant recoil, using 10 drs. and 3½ ozs. of shot. As to double 8-bores, I maintain they are far more useful than 10-bores ; they are handy, and much more powerful than 10-bores. I have one of Greener's double 8-bores that is as handy a gun as one need wish to have, and it is a very powerful gun. I can stop duck and widgeon going down wind when fighting at a tremendous pace, and I have shot a snipe with it.

I should advise every wild-fowler to have in his punt a double 8-bore ; it often comes in useful when the punt gun cannot be used, such as firing over a bank. I used to have a single 4-bore and a double 8-bore and cripple-stopper in my punt.

(Signed) G. A. PASSINGHAM.

Fermoyle, Co. Kerry, Jan. 21.

*Extract from THE FIELD, January 5th, 1895.*

THE '303 RIFLE AS A SPORTING WEAPON.

SIR,—Seeing a discussion in your columns on the '303 as a sporting weapon, I should like to say a few words about

a double '303 ejector built by W. W. Greener for me, and used on our hunting expedition near the Zambesi this season.

My late father took with him a double '303 ejector built by Reilly and Co., and he did excellent work with it at all kinds of game, even bringing down three partridges on the wing, and he bagged five little wildebeest with five bullets. I and my brother had used singles before, but had not tried the double at heavy game, such as buffalo, etc., and we were sceptical about its killing these heavy animals. We used the '450 and 12-bores at buffalo and elephant; for water-buck, wildebeest, etc., we found the Tweedie and Andrews bullets to act well. We bagged a good percentage of hits being able to place the shots better than with the larger bores; for, in spite of target practice, where the '303 might suffer, at game, for unascertained distances, the '303 beats the lot with its flat trajectory and lightness, being easy of manipulation. My servant carried the double '303, and occasionally I used it when firing at 100 yards. One day I thought it might be tried at buffalo. Sallying out, I came on a herd, and in two shots with solids—right and left—dropped a buffalo bull and cow dead; the bull was hit on shoulder, and the cow received the bullet in at the rib; it went out of the opposite shoulder. Both lay within 20 yards of where they received the bullet. On another occasion I bagged two—right and left—with one bullet each; and bagged five buffaloes with five shots—two bulls straight from behind with one bullet each. I also bagged buffaloes with one shot each through the head.

Needless to say, this pretty little toy was my companion for the remainder of the hunt. I really loved it, and always carried it myself. At charging buffalo I was always ready, and laid several of them low, and in some cases stopped a charge by a well-planted shot, sending the quarry off at an angle.

One day my brother and I were travelling through to part of the country where the white man had seldom trod,

and, in passing through a sandy river, we observed two old bull buffaloes lying fast asleep on the sand. Having the camera with me, I was tempted to try a shot ; but, as we wanted meat, and the surroundings were dense, I decided to shoot one first and photograph him afterwards. A small stream of water a few inches deep swept slowly past his tail, the brush of which nearly touched it. They both lay there unconscious of danger, when the silence of the forest was broken by the crack of the two barrels ; the '450 passed in on the point of the shoulder, and lodged about 15 in. in the shoulder ; the '303 broke the shoulder and passed out on the other side, making an ugly tear in its exit. The bull attempted to rise, but found he was incapable of doing so, and after a few struggles all was over. This was a very old bull. With these I found the '303 bullet to pass out, the same as with cows ; but the bulls in their prime kept the bullet in. Cows always fall dead after running a few yards if hit in the ribs, the bullet passing out of the shoulder.

With crocodiles we were also successful, killing twenty of them with the '303. My brother took the two eyes and top of head out of one with an Andrews bullet ; we always struck them through the brain and spinal cord.

With elephant they answered well ; and I put a bullet through an elephant bull's head with a '303 solid bullet and brought him down. The only drawback to a '303 is the want of a blood spoor ; for game, unless struck through the neck, brain, or spine, invariably run a few yards. This drawback, however, is not to be considered where the country is tolerably open : in the dense bush it is a calamity. But then close shots can be obtained ; and at short distances, say 30 yards, I generally fired at the head of a buffalo. Even if I did not kill it the first shot, I noticed that I never failed to bag it in the end, as the animals soon stand if hit about the head.

I regretted that I did not use the '303 at lions ; but I think, as it does its work so well at other animals, that one need not fear using it at the carnivora. We killed a very

large lion one day, and had a bit of ticklish work following him in long grass, using the '450 bores; and he received four dead shots, and still was capable of doing mischief. If we had used the '303, probably we should have blamed the rifle; but a rifle should be given a fair trial, for the best of weapons will have their bad days. This lion was the largest we had ever killed or seen, and Mr. Rowland Ward, Piccadilly, is setting it up for us, together with the record grey rhebok.

In conclusion, I think that I shall be offering good advice by recommending intending investors in '303 arms to go to the best makers, and get good value. The work of Greener, Reilly, Westley Richards, etc., can be relied on; and, although a single '303 burst in my servant's hands, I do not discard their use for all that. I see many in use in my vicinity that leave nothing to be desired. But a double is my fancy for any sporting weapon; and what experienced hunter does not remember the time that a second barrel has saved him from a toss, or probably his life?

HENRY T. GLYNN.

Sabie Hall, Transvaal, Nov. 30.

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*Extract from THE FIELD, June 1st, 1895.*

SIR,—It is with pleasure I have read Mr. R. T. C.'s letter in your issue of April 6, in connection with the '303 Rifle as a Sporting Weapon, as it endorses all that I have said about it. I have already stated my experience with it, and can safely say that the weapon cannot be beaten for what is called an "all-round weapon." I quite agree with Mr. C. that a 10 bore is the weapon in dense covert with elephant and rhino, where a blood spoor is necessary, and shots are obtainable at 20 and 30 yards. I have ordered from Mr. W. W. Greener a 10-bore fowling-piece, with his invisible rifling, which will be a useful weapon in wild parts and avoid the bother of two guns, which for customs purposes, native carriers, etc., is a consideration.

Of the antelope I have killed lately with the '303, all except one collapsed as if struck by lightning.

A duiker ram running, hit in at hip, smashed backbone, minced meat up in its passage, and came out near the rib, making a two-inch tear in its exit.

A duiker ram, shoulder-shot off at elbow, hanging by a piece of skin ; bone shattered into small pieces.

A duiker ram, bullet along ribs, carried away two inches of ribs, and exposed the heart (which partly hung out), passed in behind the shoulder, and came out on the chest.

Bushbuck ewe, in at one ear and out at the other, making a big tear at exit ; brain-pan smashed to pulp ; vertebræ broken also.

Bushbuck ram, in at the short rib and out at the point of the shoulder ; dropped on the spot.

Bushbuck ram, two bullets, low down in the body, running, at 200 yards ; ugly tears where the bullet passed out.

The above were killed with soft-nosed lead bullets, and the hole down the centre filled with wax. These are of Mr. C. W. Andrew's make ; they appear to me to destroy the meat too much and make ghastly wounds. And when a buck is hit on the tail, and the bullet passes along the vertebræ, it looks as if you could roll it up. A better bullet is the soft nose lead without a hole. This serves well at waterbuck, sable, wildbeest, etc., as well as at smaller game. Then there is the Tweedie bullet, with a small soft nose, hardly noticeable. This gives great penetration, and is more suitable for the heavies. I have not used Jeffery's bullet with the slits down the nickel part ; but I hear them well spoken of. I used solids at buffalo, and did well with them.

I may say that the '303 is fast coming into use in our part of the country. There is nothing like practical experience with weapons ; and the powers of the '303 in the field will astonish any hunter, especially those who have used big-bore elephant muzzle-loaders in their day. It is hard to

get over the prejudice against these tiny instruments of destruction ; and if the first shot or two be failures, the weapon is discarded—the prejudiced man forgetting the fact that every weapon has its bad days.

I should not recommend a military arm. I had one, and it nearly disgusted me against the '303. But since I have my double '303, I think there is no handier and better weapon, and I do not fear facing anything with it.

It is needless to point out the great advantage of having a cartridge that is almost smokeless. A friend of mine, hunting in Nyassaland this season, complained bitterly about the smoke of his '450 bore. And many an accident has occurred, or head of game been lost, through this drawback.

To conclude, I can confidently recommend the '303 as a sporting rifle. Its flat trajectory places it as a sporting weapon a long way ahead of any other rifle ; and the velocity of the bullet is so great that one can take aim at a crossing buck, where, with other rifles, you have to take aim into space ahead. It wants attention in cleaning, and wire brushes must be used.

(Signed) HENRY T. GLYNN.

Sabie Hall, Transvaal, May 2.

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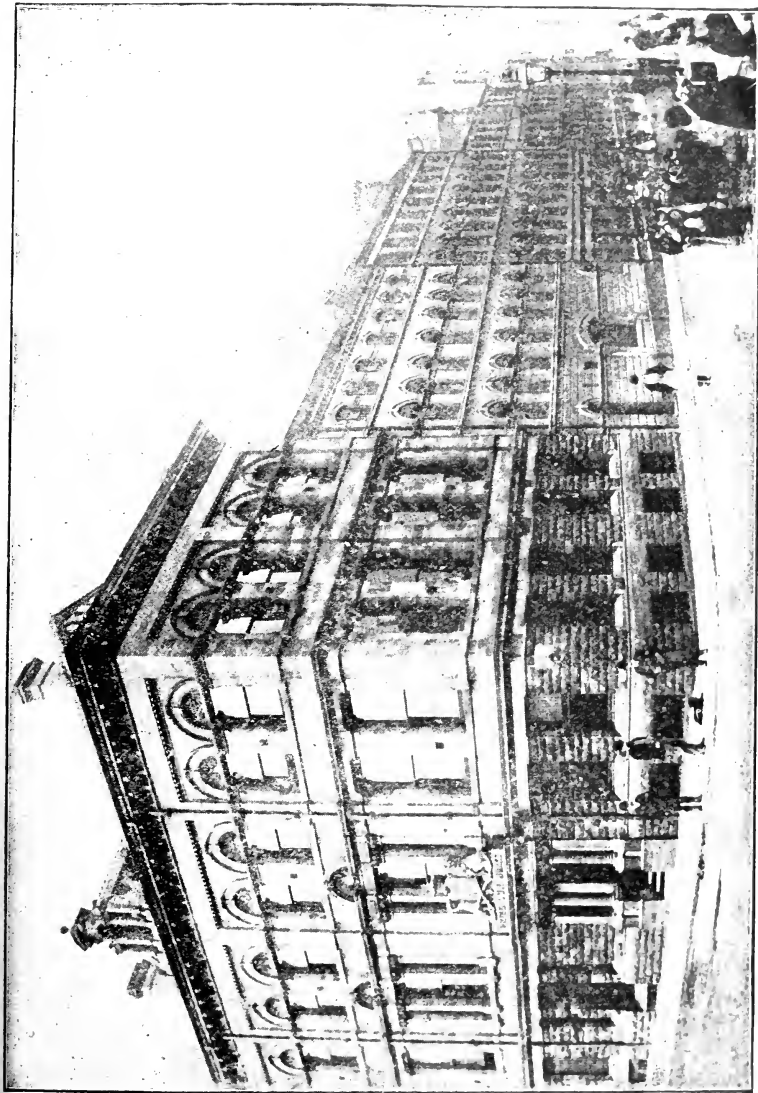


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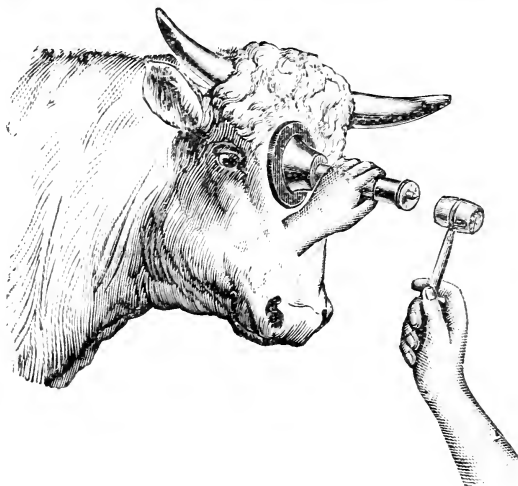
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„ Length \_\_\_\_\_ at Centre, \_\_\_\_\_ at Toe, \_\_\_\_\_ at Bump

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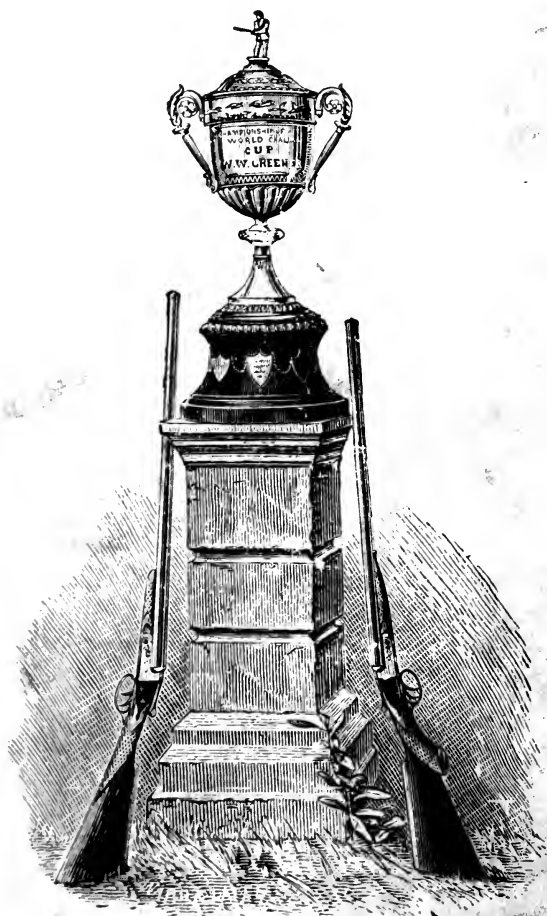




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